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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

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NASA SP-7011 (03)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Information System during the period Aug., 1964 – Sept., 1964

Scientific and Technical Information Division
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. **OCTOBER 1964**

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INTRODUCTION

SP-7011 (03) is the fourth issue of *Aerospace Medicine and Biology*, NASA's continuing bibliography for the abstracting and announcement of current references on this subject. The publication is compiled through the cooperative efforts of the Aerospace Medicine and Biology Bibliography Project (AMBBP) of the Library of Congress (LC), the American Institute of Aeronautics and Astronautics, and NASA. It assembles, within the covers of a single bibliographic announcement, groups of references that were formerly announced in separate journals and provides a convenient compilation for medical and biological scientists. Additional background details for this publication can be found in the first issue, SP-7011.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis will be placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion. The contents of this issue are comprised of abstracts that were prepared by the three contributing organizations during the period Aug. 23–Sept. 8, 1964.

Each entry in SP-7011 (03) consists of a standard citation accompanied by its abstract. It is included in one of three groups of references that appear in the following order:

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AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography OCTOBER 1964

STAR ENTRIES

N64-22728 Joint Publications Research Service, Washington, D.C.

USSR HEALTH PROTECTION DEVELOPMENTS

29 May 1964 28 p refs Transl. into ENGLISH from Gigiyena i Sanitariya (Moscow), no. 3, 1964 p 19-23, 56-58, 66-69, 83

(JPRS-24840; OTS-64-31366) OTS: $0.75

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1. THE USE OF BIOLOGICALLY ACTIVE SYNTHETIC COMPOUNDS TO RAISE THE THERMAL RESISTANCE OF THE ORGANISM Ye. I. Kuznets and N. N. Suvorov p 1-7 refs (See N64-22729 16-16)
2. ON THE METHOD OF MEASURING OVERALL VIBRATIONS V. M. Skornetskiy and P. S. Mironov p 8-11 (See N64-22730 16-16)
3. PROTECTION OF PERSONS WORKING IN ADJACENT ROOMS AND THE NEIGHBORING POPULATION FROM RADIATION EMITTED BY GAMMA-THERAPEUTIC UNITS N. I. Zol'nikova, V. Ya. Golkov, A. N. Krongauz, and I. A. Pereslegin p 11a-15 refs (See N64-22731 16-16)
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5. IN CONNECTION WITH THE ARTICLE BY B. M. SHTABSKIY ENTITLED "HYGIENIC EVALUATION OF THE REACTIONS OF THE ORGANISM TO EXTERNAL FACTORS" V. Chizhikov p 20-22
6. CLARIFICATION OF TWO ASPECTS OF THE PROBLEM OF METHODS OF INDIVIDUAL DOSIMETRIC CONTROL I. D. Kamyshenko, I. B. Kenrim-Markis, V. Ya. Margulis, A. A. Moiseyev, and R. V. Muzykantov p 23-24 (See N64-22728 16-16)

N64-22729 Joint Publications Research Service, Washington, D.C.

THE USE OF BIOLOGICALLY ACTIVE SYNTHETIC COMPOUNDS TO RAISE THE THERMAL RESISTANCE OF THE ORGANISM

Ye. I. Kuznets and N. N. Suvorov *In its* USSR Health Protection Developments 29 May 1964 p 1-7 refs (See N64-22728 16-16) OTS: $0.75

Experiments designed to study the thermal resistance of organisms were conducted on white mice. The mice were placed in a heat chamber in which the temperature was 45° to 50° C and the relative humidity was 20%. It was found that multiple injections of betazine and joint single injection of cystamine and AET (aminoethylisothiuronium bromide hydrobromide) increase the thermal resistance of white mice and, therefore, their survival time. R.T.K.

N64-22730 Joint Publications Research Service, Washington, D.C.

ON THE METHOD OF MEASURING OVERALL VIBRATIONS

V. M. Skornetskiy and P. S. Mironov *In its* USSR Health Protection Developments 29 May 1964 p 8-11 (See N64-22728 16-16) OTS: $0.75

Large displacement vibrographs (VBK and VEGIK) were used to register overall vibrations of the floor of the cab of a heavy dump truck and of the operating platform of a percussion-cable drilling unit. The operating principles of these vibrographs are presented, and the displacement-rate oscillograms obtained while using them to measure vibrations in the truck and drill are included. R.T.K.

N64-22731 Joint Publications Research Service, Washington, D.C.

PROTECTION OF PERSONS WORKING IN ADJACENT ROOMS AND THE NEIGHBORING POPULATION FROM RADIATION EMITTED BY GAMMA-THERAPEUTIC UNITS

N. I. Zol'nikova, V. Ya. Golikov, A. N. Krongauz, and I. A. Pereslegin *In its* USSR Health Protection Developments 29 May 1964 p 11a-15 refs (See N64-22728 16-16) OTS: $0.75

Soviet GUT-So-400 gamma therapy units are sources of gamma radiation with an energy of about 1.25-million electron volts. A comprehensive study of the radiation emitted by these gamma-therapeutic units was made. It was found that with ordinary thickness of ceilings and floors (up to 50 cm of concrete) the gamma-radiation dose rate in rooms located above a GUT-So-400 treatment room can exceed the maximum permissible values. With conventional-treatment room dimensions (25 square meters), the radiation dose rate in rooms located next to the treatment room does not exceed the maximum permissible value with a wall thickness of at least 100 cm. The gamma-radiation dose rate on the hospital grounds 5 meters from the walls of a treatment room was found to depend on the height of the window placement and on the thickness of the exterior walls of the hospital. Measures that can be taken in order to provide safety for persons working in rooms adjoining the therapeutic, as well as to the public at large, are discussed. R.T.K.

N64-22732 Joint Publications Research Service, Washington, D.C.
CLARIFICATION OF TWO ASPECTS OF THE PROBLEM OF METHODS OF INDIVIDUAL DOSIMETRIC CONTROL
I. D. Kamyshenko, I. B. Kenrim-Markis, V. Ya. Margulis, A. A. Moiseyev, and R. V. Muzykantov *In its* USSR Health Protection Developments 29 May 1964 p 23-24 (See N64-22728 16-16) OTS: $0.75

The IFK and the ILK dosimeter are recommended for measuring weekly radiation doses from X-ray diagnosis and therapy. Dosimeters built on the principle of thermoluminescent glass can also be used. It is felt that in measuring radiation doses in both therapeutic and diagnostic X-ray offices, proper measures should be taken to compensate for, or eliminate, the energy dependence of these dosimeters, and special calibration of these instruments should be carried out as a preliminary measure. R.T.K.

N64-22742 Joint Publications Research Service, Washington, D.C.
STUDIES IN COLOR VISION
Ye. B. Rabkin and Ye. G. Sokolova 22 Jun. 1964 32 p Transl. into ENGLISH from Biol. i Med. (Moscow), 1964 p 1-32 (JPRS-25184; OTS-64-31533) OTS: $1.00

This book is concerned with contemporary presentations on physiology, pathology, and hygiene, relative to the influence of various colors of the visible spectrum on the human eye, and on man's central nervous system and psyche. It discusses the principles of creation of the optimum color medium for the preservation and improvement of the visual functions. Emphasis is placed on light and color in nature, the structure of the human eye, color vision and its disorders, and the hygiene of color vision (e.g., the optimum color for schools and factories). I.v.L.

N64-22744 Joint Publications Research Service, Washington, D.C.
***VESTNIK* OF USSR ACADEMY OF MEDICAL SCIENCES, VOL XIX, NO. 5, 1964**
A. A. Pokrovskiy et al 23 Jun. 1964 155 p refs Transl. into ENGLISH from Vestnik Akad. Med. Nauk SSSR (Moscow), v. XIX, no. 5, 1964 p 3-96
(JPRS-25241; TT-64-31554) OTS: $3.00

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1. THE PROBLEM OF DETERMINING MAN'S NEED FOR FOOD SUBSTANCES A. A. Pokrovskiy p 1-14a refs
2. PROBLEMS OF PLANNING THE PROPER DIET FOR THE POPULATION G. M. Geller p 15-26
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4. HUMAN VITAMIN REQUIREMENTS AND INDICES FOR STUDYING IT V. V. Yefremov p 45-59a refs
5. SOME PROBLEMS OF CURRENT IMPORTANCE IN THE NUTRITION OF CHILDREN Y. K. Polteva p 60-65 refs
6. SCIENTIFIC SUBSTANTIATION OF METHODS OF PROCESSING FOOD PRODUCTS FOR PATIENTS WITH DISEASES OF THE GASTROINTESTINAL TRACT AND FOR YOUNG CHILDREN p 66-74 refs
7. CURRENT PROBLEMS OF HYGIENE IN CONNECTION WITH THE PRESENCE OF EXTRANEOUS SUBSTANCES IN FOODSTUFFS A. I. Shtenberg and A. D. Ignat'yev p 75-84 refs
8. THE POSSIBLE CARCINOGENIC PROPERTIES OF ADMIXTURES IN FOODSTUFFS AND THE PRINCIPLES OF DETERMINING THEM I. M. Neyman p 85-92a
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10. DIETARY THERAPY OF CORONARY ARTERIOSCLEROSIS E. G. Paramonova p 103-113 refs
11. CHARACTERISTICS OF VITAMIN METABOLISM IN THE AGING ORGANISM Y. M. Maslenikova p 114-126 refs
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13. CONGRESSES AND CONFERENCES S. I. Filippovich p 138-143
14. SECOND SYMPOSIUM ON RADIO TELEMETERING IN PHYSIOLOGY AND MEDICINE V. V. Rozenblat, A. T. Vorob'yev, and V. M. Forshtadt p 144-151 refs

N64-22752 National Research Corp., Cambridge, Mass.
EFFECTS OF SIMULATED SPACE ENVIRONMENTS ON THE LIABILITY OF MICROORGANISMS Quarterly Status Report, Jan. 16-Apr. 15, 1963
Norman S. Davis, Gerald J. Silverman, and Frank C. Benner (MIT) 9 May 1963 6 p
(Contract NASr-41)
(NASA-CR-50333) OTS: $1.10 ph

During this period of testing the viability of microorganisms in simulated space environments, the combined effects of thermal and ultrahigh vacuum exposure were studied in continuing experiments with organisms isolated from Mohave Desert soils. Studies of the combined effects of gamma radiation and ultrahigh vacuum on selected microorganisms were resumed in an improved vacuum system. The ultraviolet radiation system has been modified so that the intensity of the lamp output was reduced from 1000 to 60 microwatts per square centimeter, thereby permitting studies at lower ultraviolet intensities. N.E.A.

N64-22754 National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CHEMICAL EVOLUTION AND THE ORIGIN OF LIFE
Cyril Ponnamperuma [1963] 16 p refs Submitted for Publication
(NASA-TM-X-54008)

The origin of life is discussed from the standpoint of the evolution of the inorganic, organic, and biological material necessary for the formation and support of living organisms. Taken into consideration is the chemical evolution of the elements of the periodic table from the primeval cloud of hydrogen gas by a series of reactions. These materials form the inorganic materials, which form the organic materials that compose living organisms. Because of the progressive series of change in this scheme, life is considered a special and very complicated form of the motion of matter. Life may then be considered as an inevitable process that must appear in the cosmos where conditions are favorable. Attention is directed toward the possibility of the existence of life somewhere in the universe other than earth. Experiments are discussed in which several constituents of the nucleic acid molecule have been synthesized, beginning with the primitive atmospheres. C.L.W.

N64-22755 Resources Research, Inc., Washington, D.C.
"GULLIVER", AN EXPERIMENT FOR EXTRATERRESTRIAL LIFE DETECTION AND ANALYSIS
Gilbert V. Levin, Allen H. Heim, M. F. Thompson, N. H. Horowitz (Calif. Inst. of Tech.), and D. R. Beem [1963] 14 p refs

Presented at the COSPAR 4th Intern. Space Sci. Symp., Warsaw, 10 Jun. 1963
(Contract NASr-10)
(NASA-CR-55511) OTS: $1.60 ph

The Gulliver experiment will function in the following manner. At least two instruments, one a test and the other a control, will be incorporated into a capsule destined to land on Mars. Sealed ampoules contain the radioactive medium. When the capsule lands on Mars, squibs will fire the projectiles. Each will deploy a 25-foot-long retrieval line over the surface of the planet. The motor will then reel the line, together with adhering particulate matter, into an incubation chamber. After the line is retrieved, the incubation chamber will be sealed and the ampoule will be broken, releasing the radioactive medium into the line. If organisms are present on the soil particles and are able to metabolize any of the labeled substrates, radioactive gases which will be detected with a Geiger tube, will be produced. All data will be transmitted to Earth by radio. The production of a typical biological growth curve for the test instrument and a negative, or materially reduced, response from the control instrument, which contains a broad spectrum antimetabolite, will constitute evidence of microbial life on Mars. I.v.L.

N64-22756 Resources Research, Inc., Washington, D.C.
RADIOISOTOPIC BIOCHEMICAL PROBE FOR EXTRATERRESTRIAL LIFE Second Annual Progress Report to NASA
Gilbert V. Levin, Norman H. Horowitz, Allen H. Heim, and Mary-Frances Thompson 26 Mar. 1963 152 p
(Contract NASr-10)
(NASA-CR-55318) OTS: $11.50 ph

Extensive laboratory investigations and field testing were conducted. These tests further substantiated the feasibility of the principle on which Gulliver (radioisotopic biochemical probe for extraterrestrial life) is based. Biological and instrumentation studies were pursued concurrently and interdependently. Gulliver III exhibited omnidirectional capability, importance as an antimetabolite injection system, and usefulness for flushing. This is a better technique for deploying sample collection lines. G.D.B.

N64-22757 Florida State U., Tallahasee
[BIOSATELLITE PROJECT] Progress and Status Report on NASA Grant NsG-103-61, Sept. 1, 1962–Feb. 28, 1963
A. Gib De Busk 2 May 1963 3 p
(Grant NsG-103-61)
(NASA-CR-50046) OTS: $1.10 ph

"Preliminary breadboard" studies for a series of biosatellite flights have been initiated. Experiments to be included are: back mutation, "woodward" death, recessive lethal dosage, and inositoless death. Mutation frequencies, lethal effects, and physiological injury will be reported. Also included are: mutation studies with alpha particles, biophysical studies of *Neurospora crassa*, cytological studies of *Neurospora*, analog inhibition and permease studies, and subchromosomal mutation by U.V. treatment. D.E.R.

N64-22758 IIT Research Inst., Chicago, Ill.
LIFE IN EXTRATERRESTRIAL ENVIRONMENTS Quarterly Status Report, May 15–Aug. 15, 1963
Charles A. Hagen [1963] 16 p refs
(Contract NASr-22)
(NASA-CR-50934; IITRI-C194-10) OTS: $1.60 ph

Eighty-eight cultures of facultative anaerobic bacteria were obtained from 253 isolates from various California desert soils. The cultures are screened for survival in a simulated Martian environment. A nonsporeforming organism identified as *S. aurantiaca* demonstrated a high resistance to the simulated Martian environment, after 112 days' exposure. Initial screening tests indicated good survival of *Bacillus cereus var mucoides*; 37% of the cells were recovered as total count and the spore count increased 4.9 times after 28 days' exposure to the simulated Martian environment. J.R.C.

N64-22759 Armour Research Foundation, Chicago, Ill.
LIFE IN EXTRATERRESTRIAL ENVIRONMENTS Phase Report [Feb. 15, 1962 – Feb. 28, 1963]
Charles A. Hagen and Ervin J. Hawrylewicz 28 Feb. 1963 14 p
(Contract NASr-22)
(NASA-CR-50516; ARF-C-194-8) OTS: $1.60 ph

Two *aerobacter* cultures, ATCC 13048 and butanediol-producing ATCC 8724, were subjected to a simulated Martian environment for 28 days to determine their survival. At the end of 28 days, less than 1% of the cells survived in either of the cultures. A total of 235 representative microorganisms was isolated from five desert-soil samples. The isolates were recovered from the samples before exposure to the Martian environment and after exposure for 28 and 84 days. Members of genus *Bacillus* were the most frequently present in the soil samples, *Actinomyces* were found in fewer numbers, and, occasionally, *Micrococcus* and molds were present. With increased time in the Martian environment, there was a decrease in the number of *Actinomyces*. Two pure *Coccus* and two pure *Bacillus* cultures that were isolated from the desert-soil samples exposed to the Martian environment for 84 days were studied. The *Coccus* cultures were more resistant to inoculation-flushing procedures and to the simulated Martian environment than were the *Bacillus* cultures. Author

N64-22760 Melpar, Inc., Falls Church, Va.
RESEARCH ON DETECTION OF EXTRATERRESTRIAL LIFE BY ULTRAVIOLET SPECTROPHOTOMETRY Second Quarterly Progress Report, Apr. 1–30 Jun. 1963
Sol S. Nelson 1963 26 p refs
(Contract NASw-571)
(NASA-CR-50815) OTS: $2.60 ph

Absorption of a narrow region of the far ultraviolet by materials of biological origin was studied. The peptide bond was found to exhibit a characteristic absorption of ultraviolet light of 185 to 190 mμ. Absorption maxima between 185 and 190 mμ were found for phenyl alanine, tryptophan, tyrosine, serum albumin, and ribonuclease. In the case of the two proteins, the absorbancies were studied as a function of pH and were found to pass through a maximum at approximately pH 7. Absorption maxima at the wavelength of interest were not observed with glycine, alanine, or glycyl glycine. Author

N64-22761 Esso Research and Engineering Co., Linden, N.J.
DEVELOPMENT OF HYDROCARBON ANALYSES AS A MEANS OF DETECTING LIFE IN SPACE Quarterly Report
W. G. Meinschein 1 Jul. 1963 10 p refs
(Contract NASw-508)
(NASA-CR-50703) OTS: $1.10 ph

Gas chromatograms of alkanes obtained with Apiezon L-coated capillary columns apparently provide a means of "fingerprinting" mixtures of saturated hydrocarbons. Alkanes

from bat guano and from a 60-million-year-old sediment both contain higher concentrations of even- than of odd-carbon number n-paraffins in the C_{11} to C_{20} range and higher concentrations of odd- than of even-carbon number n-paraffins in the C_{23} to C_{31} range. Fischer–Tropsch saturated hydrocarbons, on the other hand, show a systematic increase followed by a systematic decrease in concentrations of homologous alkanes. These concentrational changes can be explained by the loss of volatile components from an abiotic product in which the reaction equilibria led to a decrease in concentration of homologous hydrocarbons with increasing carbon number. Nonsystematic fluctuations in the concentration versus carbon number plots of homologous alkanes appear to be characteristic of biological alkanes of low as well as of high molecular weights. Components of the benzene extract of the Orgueil meteorite vary nonsystematically in concentration with changing carbon number. Author

N64-22764 California U., Berkeley Space Sciences Lab.
REFLECTION SPECTRA OF BIO-ORGANIC MATERIALS IN THE 2.5–4μ REGION AND THE INTERPRETATION OF THE INFRARED SPECTRUM OF MARS
D. G. Rea, T. Belsky, and M. Calvin [1962] 22 p refs
(Grant NsG-101-61)
(NASA-CR-50208) OTS: $2.60 ph

Infrared absorption bands have been observed on the Martian surface at 2710(3.69μ), 2793(3.58μ), and 2910 cm^{-1}(3.45μ); these bands fall in the region where organic molecules and some inorganic compounds absorb. Therefore, it is so indicated that carbohydrates, especially aldehydes, are present in large quantities on Mars. To ascertain this theory, infrared spectrometers are included in spacecraft experimental packages destined for Mars. Also, the arguments, pro and con, for the existence of life on Mars are given, and an explanation of the infrared appearance of the planet, based on the existence of volcanic ash and suitable winds, is treated. D.E.R.

N64-22767 Florida State U., Tallahassee Genetics Lab.
GENETIC STUDIES IN THE SPACE ENVIRONMENT, Final Summary Report
A. Gib De Busk [1963] 32 p refs
(Grant NsG-103-61)
(NASA-CR-55359) OTS: $3.60
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APPENDIX
1. PREPARATION OF CONIDIA FOR THE EXPERIMENT 1 p
2. RECESSIVE LETHAL TECHNIQUE 4 p refs
3. THE FILTRATION CONCENTRATION ("WOODWARD") TECHNIQUE 5 p refs
4. BACK MUTATION TECHNIQUE 3 p refs
5. MUTATION RECOVERY THROUGH "INOSITOL-LESS DEATH" 3 p refs
6. PROCEDURE FOR STAINING NUCLEI OF *NEUROSPORA CRASSA* 2 p
7. STUDIES OF NUCLEAR NUMBER OF CONIDIA OF *NEUROSPORA CRASSA* 4 p
8. PROCEDURE FOR ISOLATION OF HIGH MOLECULAR WEIGHT DNA FROM *NEUROSPORA CRASSA* 3 p

N64-22768 Yale U., New Haven, Conn.
COMBINED SEMI-ANNUAL STATUS REPORT, NOV. 1, 1961–OCT. 31, 1962 [DETERMINATION AND ANALYSIS OF THE PROPERTIES AND CHARACTERISTICS OF EXTREMELY SMALL FREE-LIVING AND SELF-REPLICATING CELLS]
Harold J. Morowitz [1962] 3 p ref
(Grant NsG-208-62)
(NASA-CR-50397) OTS: $1.10 ph

The objectives of this study are (1) a search for small microorganisms which would missed by the standard assay methods, and (2) the characterization of Pleuropneumonia-like organisms as examples of very simple cells (with a possible relationship to primitive cells). The organisms for study were collected from the following sources; estuarine, marine, and pond waters, arable soils, nasopharyngeal washings from individuals with upper respiratory diseases, and plant homogenates. Porous cellulose ester membranes were used in the primary isolation of the cells. After isolation or screening, the organisms underwent filtration before being innoculated on specially prepared media for characterization studies. Twenty filterable forms have been isolated from estuarine and marine waters. One filterable strain was obtained from soil and one from a plant homogenate. Fresh-water ponds failed to give filterable forms that could be subcultured. The remaining material sources gave no filterable forms. The growth medium for pleuropneumonia-like organisms still presents many problems, and efforts to simplify this medium are underway. N.E.A.

N64-22769 General Mills Inc., Minneapolis, Minn.
RESEARCH TO DETERMINE THE EXISTENCE AND IDENTITY OF VIABLE MICROORGANISMS IN THE STRATOSPHERE First Quarterly Status Report, Mar. 18–Jun. 18, 1963
V. W. Greene [1963] 3 p
(Contract NASw-648)
(NASA-CR-50698) OTS: $1.10 ph.

Arrangements for the first two spaceflights to determine the existence and identity of viable microorganisms in the stratosphere were completed. A launch and recovery of a four-stratosphere microorganism sampler payload, which reached an altitude of 90,000 ft, were made. There were mechanical malfunctions of the anticontamination locks of the samplers, which limited the validity of the biological data. Results of the experiment suggest that (1) the sterilizing and storage techniques prior to launch were statisfactory, (2) the concept of sampling during descent has been properly programed, and (3) the contamination controls designed for the program will serve their purpose if there are no mechanical malfunctions. The samplers and instrument packs were recovered intact and are being prepared for another flight. N.E.A.

N64-22771 National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A BIOLOGICAL SYNTHESIS OF SOME NUCLEIC ACID CONSTITUENTS
Cyril Ponnamperuma 1963 2 p refs Presented at the Conf. on the Origin of Prebiol. Systems, Wakulla Springs, Fla., 27–30 Oct. 1963
(NASA-TM-X-54021) OTS: $2.60 ph

The synthesis of the purines, pyrimidines, sugars, nucleosides, and nucleotides found in the nucleic acid molecule was investigated. The results are relevant to the problem of the origin of life, because the conditions of the reactions were aqueous and the concentrations of materials were very low; the sources of energy used are those most likely to have existed under primitive earth conditions. G.D.B.

N64-22772 National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

MORPHOLOGY AND CHEMISTRY OF MICROSPHERES FROM PROTEINOID

Richard S. Young [1963] 10 p refs Presented at the Conf. on the Origin of Prebiol. Systems, Wakulla Springs, Fla., 27–30 Oct. 1963

(NASA-TM-X-51514) OTS: $1.10 ph

This report describes the formation of microspheres made by boiling and cooling proteinoid solutions; they exhibit many of the behavioral characteristics of complex protein-like molecules that constitute "living matter," that is, organic compounds that are the fundamental building blocks of the component parts of living cells. G.D.B.

N64-22773 National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

PRELIMINARY INVESTIGATIONS IN THE USAGE OF GAS CHROMATOGRAPHY FOR THE DETECTION OF LIFE ON MARS

Vance I. Oyama [1963] 11 p refs Submitted for Publication

(NASA-TM-X-50806) OTS: $1.60 ph

A 0.010" capillary column 300 ft long, coated with diethylene glycol succinate polyester, was temperature programed for the analyses of some microorganisms isolated from soils in order to ascertain as many of the products of protein thermal decomposition as is possible with a single system. Results indicate that, under these reproducible conditions during linear temperature programing, the chromatographic peaks descriptive of the retention products occur with a periodicity common to all of the organisms. There are differences in peak height relative to adjacent peaks, but the chromatograms indicate that thermal decomposition products of microorganisms can be displayed in a fashion to show equivalence. The relative peak heights in each separate chromatogram show differences and may indicate differences in the relative amounts of the precursor organic substance. Also a pyrolyzate chromatogram of crystalline bovine albumin, under similar conditions, was made. Similar patterns, corresponding to early appearing chromatographic retention times of the microorganisms, were reproduced. Thus, similar patterns for proteins, whether they be of plant or animal origin, seem to exist. I.v.L.

N64-22774 Stanford U., Calif. School of Medicine

AN INSTRUMENTATION CRISIS IN BIOLOGY

Joshua Lederberg May 1963 9 p

(Grant NsG-81-60)

(NASA-CR-51095) OTS: $1.10 ph

The inadequacy of the current art in biochemical instrumentation was brought to light by efforts to meet the requirements of exobiological studies. An immense amount of information is still locked up in spectra (optical absorption, magnetic resonance, rotary dispersion, mass spectra) and similar "fingerprints," which require the intensive development of the "man-computer x symbiosis" for adequate resolution. Digital computation may help answer the needs of the biochemist in regard to instrumentation. Precision can be improved in data-processing links as an inherent virtue of a digital system. Precision is also very often a signal-to-noise problem, and an ideal instrument should have the flexibility to allow accuracy to be achieved at the price of speed, in accordance with local needs. The memory capacity of the computer for averaging over a period of time and the use of correlation techniques to extract signals from noisy outputs suggest the application of simple computer techniques to improve the utility and to simplify the design of such workaday instruments as the absorption spectrophotometer. Probably more important is the construction of prototypes of new instruments by programing a general-purpose computer to set up the control and signal processing systems, instead of de nova construction. Time-sharing and the LINC computer systems will be investigated in the light of alleviating the instrumentation crisis in the area of biochemistry and in the area of particle counting which is the fundamental measurement in many aspects of microbiology and cytology. I.v.L.

N64-22775 Florida State U., Tallahassee Inst. for Space Biosciences

[RESEARCH IN SPACE BIOLOGY AND RELEVANT PHYSICAL ASPECTS OF PLANETARY AND SPACE ENVIRONMENTS] Semiannual Research Status Report

S. Fox, S. Hess, and C. Metz 1 May 1963 11 p

(Grant NsG-173-62)

(NASA-CR-50483)

The following results were obtained from investigations in space biosciences: (1) Studies on the thermal copolymerization of cystine with other amino acids reveal that cystine can form many other amino acids, aspartic acid being quantitatively prominent among these. (2) Thermal proteinoids were further characterized through improvements of the Akabori hydrazinolysis method. These studies show that proteinoids tend to have 2-4 C-termini per N-terminus which indicates a degree of branching comparable to that found in proteins. (3) The catalytic activity for *p*-nitrophenyl acetate of the proteinoids is found to a considerable degree in the thermal copolymers of a few amino acids, such as aspartic acid and histidine. (4) Evidence was obtained spectrally for the binding of hemes by proteinoid. (5) The active site of hydrolytic enzymes was synthesized. (6) Preparations of the thermal polymer of cytidylic acid are found to be attacked by ribonuclease. (7) The simultaneous polymerization of Leuchs anhydrides of the amino acids, common to protein, was accomplished and simplified. (8) A theoretical model of the general circulation of Venus in the deep layers of the atmosphere was formulated. (9) The first conception of a frost-point hygrometer to be dropped into the atmosphere of Mars was proved feasible. (10) Two clones of callus cells from *Haplopappus gracilis* were grown on a simple mineral-sugar-vitamin-agar medium through 13 subcultures. (11) A study of the pachytene and metaphase in the corresponding allotetraploid of an F, intergeneric hybrid, *Lycopersicon esculentum* X *Solanum lycopersicoides*, indicated that synopsis is almost completely preferential in the tetraploid. I.v.L.

N64-22776 Argonne National Lab., Ill.

GROWTH AND DEVELOPMENT OF PLANTS IN COMPENSATED GRAVITATIONAL, MAGNETIC, AND ELECTRICAL FIELDS Interim Report No. 2

Solon A. Gordon et al 1 Jul. 1963 35 p refs

(NASA Order-R-46)

(NASA-CR-51180) OTS: $3.60 ph

Biological response to continuous accelerations in magnitude on the order of a micro-g has been observed. To determine the threshold of such accelerations, a variable-velocity two-dimensional compensator has been developed. A multiple one-dimensional apparatus was also constructed for pilot experiments with tissue cultures. A rigorous mathematical foundation was derived for design of a 3-dimensional compensator for field nullification. Author

N64-22777 National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

BACTERIA UNDER SIMULATED MARTIAN CONDITIONS

R. S. Young, P. H. Deal, J. Bell, and J. L. Allen [1963] 12 p refs Presented at the COSPAR Symp. Warsaw, 3–11 Jun. 1963 Submitted for Publication
(NASA-TM-X-50873) OTS: $1.60

A new technique for simulation of known parameters of the Martian environment is discussed along with possible biological implications. The response of bacteria to such simulation is demonstrated in terms of survival and growth, showing that certain bacteria will not only survive, but grow during simulated Martian freeze—thaw cycling if water is present. Ways are demonstrated in which water can be present on Mars although not detectable with current technology. C.L.W.

N64-22780 Aeronutronic, Newport Beach, Calif.
EXPERIMENTAL STUDIES FOR THE DETECTION OF PROTEIN IN TRACE AMOUNTS (J-BANDS) First Quarterly Status Report, 1 Feb. 1962–30 Apr. 1962
R. E. Kay [1962] 4 p
(Contract NASr-84)
(NASA-CR-56520; QLR-62-10) OTS: $1.10 ph

Nine cyanine and carbocyanine dyes were tested for J-band formation with gelatine over the pH range of 1 to 12. Of these, only 3,3' diethyl-9 methyl 4,5,4',5' dibenzothiacarbocyanine bromide (1) gave a J-band. Dyes that had structures similar to 1, except that they were not substituted at the 4,5,4',5' position, did not respond. Carbocyanine dyes substituted at the 4,4' and/or 5,5' position are being synthesized to be tested. Light sensitivity, heat sensitivity, decomposition during storage, and pH studies are discussed for 1. N.E.A.

N64-22781 Stanford U., Palo Alto, Calif. Biophysics Lab.
MOLECULAR EVOLUTION IN PROTOBIOLOGICAL SYSTEMS, INCLUDING A SEARCH FOR CATALYSTS AND CATALYTIC ACTIVITY IN THE INTERMEDIATE SYSTEMS WHICH FORM DURING THE SYNTHESES OF LOW MOLECULAR WEIGHT ORGANIC COMPOUNDS Semiannual Status Report No. 3, Dec. 1, 1962–May 31, 1963
M. S. Blois, Jr. and H. H. Pattee Jul. 1963 3 p refs
(Grant NsG-218-62)
(BL-86) OTS: $1.10 ph

The ultraviolet photochemistry of amino acids, purines, and pyrimidines was studied along with the protection against uv photolysis afforded by clay surfaces when small molecules are adsorbed upon them. Experiments concerned with the production of polymeric and/or insoluble products by the irradiation of aromatic amino acids by ultraviolet were also conducted. One result of the experiments was the confirmation of the predicted stabilizing effect of a clay (montmorillonite) surface upon which guanine was adsorbed. Under given irradiation conditions, guanine in aqueous solution was photolyzed to > 99% in an exposure of 30 hours. Under similar conditions, the guanine adsorbed on clay was, to a considerable extent, still unaffected after 183 hours. P.V.E.

N64-22783 Rochester U., N.Y.
DEVELOPMENT OF A LIFE DETECTOR AND ANALYTICAL INSTRUMENTS FOR PLANETARY SOILS Status Report, Sep. 1961–Feb. 1963
W. Vishniac [1963] 5 p
(Grant NsG-209-62)
(NASA-CR-56523) OTS: $1.10 ph

A flight model of an extraterrestrial life detector, called the Wolf Trap, is being constructed; and a laboratory model of a device to analyze major soluble constituents of planetary soils is described. The soil analyzer operates on paper chromatography principles, and the information is transmitted as the R_f of the individual spots. A pumping apparatus slowly transfers soil extracts to a continuous strip of chromatography paper. The apparatus selects on command from a bank of extracting liquids, spray reagents, and developers. The developed paper strip then moves past a phototube scanner, and the location of the spots is transmitted and recorded. M.P.G.

N64-22784 National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE SPACE ENVIRONMENT IN BIOLOGICAL PERSPECTIVE
Webb Haymaker [1962] 13 p refs Presented at the AFIP Centennial, Washington, Nov. 7–9, 1962
(NASA-TM-X-51744) OTS: $1.60 ph

A review of space environment in biological perspective includes: (1) the possibility of extraterrestrial life on the Moon, Mars, and Venus; and (2) the two aspects of environmental biology, i.e., the role of environmental inputs in the establishment and maintenance of life organization and life processes such as biological rhythmicity; and the delineation of those aspects in the space environment which are biologically hostile. I.v.L.

N64-22785 National Research Corp., Cambridge, Mass.
EFFECTS OF SIMULATED SPACE ENVIRONMENTS ON THE VIABILITY OF MICROORGANISMS Quarterly Status Report, Apr. 16, 1962–Jul. 15, 1962
Norman S. Davis, Gerald Silverman, Samuel A. Goldblith (MIT), and Wayne H. Keller 19 Sep. 1962 25 p refs
(Contract NASr-41; NRC Proj. 42-1-0113A)
(NASA-CR-56524) OTS: $2.60 ph

Microorganisms have been exposed to controlled environment to investigate their survival capabilities in space and provide data relevant to the transportation of organisms from one planet to another. The spores from pure cultures of *B. stearothermophilus, B. subtilis var. niger, B. megaterium, C. sporogenes,* and *A. niger* were exposed to high temperature (90° C) and gamma irradiation (200,000 rads) at both atmospheric and 1×10^{-8} torr pressures. At 90° C there were no survivors after exposure to vacuum, and only *B. subtilis var. niger* survived seven days' exposure to this temperature at atmospheric pressure. From the irradiation experiments, it was shown that *B. megaterium* is the most resistant to gamma rays. All of the spores were more resistant to irradiation under vacuum conditions than under atmospheric conditions. R.C.M.

N64-22786 National Research Corp., Cambridge, Mass.
EFFECTS OF SIMULATED SPACE ENVIRONMENTS ON THE VISIBILITY OF MICROORGANISMS Quarterly Status Report, Oct. 16, 1962–Jan. 15, 1963
Norman S. Davis, Gerald Silverman, Samuel A. Goldblith (MIT), and Frank C. Benner 12 Mar. 1963 9 p
(Contract NASr-41) OTS: $1.10 ph

The study of microorganisms under vacuum simulated space environment is reported. Organisms have been isolated from samples of Mohave Desert soils. Only eight of the 50 cultures obtained were able to survive vacuum at 120° C. Seven of the cultures were colorless, punctiform, and sporeforming, while the other culture was amber and butyrous. Spores of microorganisms including *A. niger* and *B. subtilis* var. *niger* are being subjected to UV irradiation while under vacuum. In preliminary tests these spores showed 0.1% and 0.5% survival, respectively, after being subjected to a UV dose of 200,000 ergs. R.C.M.

N64-22787 Florida State U., Tallahassee Inst. for Space Biosciences
EMERGENT ORGANIC CHEMISTRY UNDER VARIOUS PLANETARY CONDITIONS AND EXTRATERRESTRIAL MATRICES AND ENVIRONMENTS First Annual Report [1 Oct. 1961–30 Sep. 1962]
Sidney W. Fox, Seymour L. Hess, and Charles B. Metz 1 Nov. 1962 52 p refs
(Grant NsG-173-62)
(NASA-CR-56526) OTS: $5.60 ph

The organic chemistry that can emerge under a variety of planetary conditions is being investigated. Studies that are summarized and relate to this emergence are: abiogenesis, planetary atmospheres, the genetic mechanisms of plant tissue cultures and the evolutionary divergence of chromosomes, and fertilization physiology. A.R.B.

N64-22788 Florida State U., Tallahassee Inst. for Space Biosciences
STUDY OF ORGANISMS UNDER TERRESTRIAL AND EXTRATERRESTRIAL CONDITIONS First Semi-Annual Report
Sidney W. Fox, S. L. Hess, and C. B. Metz 15 Mar. 1962 12 p refs
(Grant NsG-173-62)
(NASA-CR-56527) OTS: $1.60 ph

An investigation is made of processes involved in the origin, evolution, and development of organisms under terrestrial and extraterrestrial conditions. The study includes work on the following: proteinoids, microspheres, the vertical structure of the atmosphere of Venus, immunochemical studies, research on antiradiation extracts, and observations of Jupiter. J.R.C.

N64-22789 Yale U., New Haven, Conn.
DEVELOPMENT OF A LIFE DETECTOR FOR PLANETARY SOILS Final Report, Jun. 1960–Aug. 1961
Wolf Vishniac [1961] 7 p
(Grant NsG-19-59)
(NASA-CR-56528) OTS: $1.10 ph

This report deals with the final laboratory version of a device which is capable of detecting living organisms when placed on soil or on the laboratory floor. This device operates on the principle of introducing dust samples into one or more selected media in which the growth of the microorganisms is detected by optical and chemical changes in the medium, i.e., the change in light transmission and the change in pH, respectively. I.v.L.

N64-22790 California U., Berkeley Space Sciences Lab.
BIOCHEMICAL ACTIVITIES OF TERRESTRIAL MICROORGANISMS IN SIMULATED PLANETARY ENVIRONMENTS Interim Report, 1 Aug. 1962–31 Jan. 1963
Samuel Silver 5 Apr. 1963 6 p refs Ser. 4, Issue 24
(Grant NsG-126-61)
(NASA-CR-56529) OTS: $1.10 ph

Experiments concerned with extremes of temperature and other environmental factors, which might serve as possible restraints to the development of microorganisms on nearby planets, have been conducted. The results show that a variety of microbial types in their native soil environments, as in artificial media, can survive temperatures from ca. 200° to 300° K (Mars). Spore-forming bacteria capable of withstanding 10^{-8} mm Hg were recovered from soil samples maintained under anaerobic conditions at 373° K (Moon). A comparative study of photosynthetic bacteria and algae is being conducted at present. J.A.J.

N64-22791 Communication Research Inst., Miami, Fla.
A STUDY OF THE FEASIBILITY AND METHODOLOGY FOR ESTABLISHING COMMUNICATION BETWEEN MAN AND OTHER SPECIES Interim Report [1 Jul. 1962–1 Jan. 1963]
John C. Lilly 9 Jan. 1963 9 p
(Grant NsG-278-62)
(NASA-CR-56530) OTS: $1.10 ph

Current research is proceeding along two major lines, i.e., an analysis of the dolphins' own emissions to one another and their development of the English language. The sonic spectrum available to these animals is being studied. A study of the man-dolphin relationship is continuing and has already shown that a wild dolphin within a few hours of capture will accept boys riding on its back. R.C.M.

N64-22792 Stanford U., Calif. Biophysics Lab.
MOLECULAR EVOLUTION IN PROTOBIOLOGICAL SYSTEMS, INCLUDING A SEARCH FOR CATALYSTS AND CATALYTIC ACTIVITY IN THE INTERMEDIATE SYSTEMS WHICH FORM DURING THE SYNTHESES OF LOW MOLECULAR WEIGHT ORGANIC COMPOUNDS Semiannual Status Report No. 1, Dec. 1961–May 1962
M. S. Blois, Jr. and H. H. Pattee Jul. 1962 5 p
(Grant NsG-218-62)
(NASA-CR-56531; BL-71) OTS: $1.10 ph

Molecular evolution in protobiological systems is under investigation. Research includes a search for catalysts and catalytic activity in the intermediate systems, which form during the syntheses of low-molecular-weight organic-compounds. I.v.L.

N64-22793 Resources Research, Inc., Washington, D.C.
RADIOISOTOPIC BIOCHEMICAL PROBE FOR EXTRATERRESTRIAL LIFE Quarterly Progress Report No. 7
Gilbert V. Levin, Norman H. Horowitz, Allen H. Heim, and Mary-Frances Thompson 10 Dec. 1962 31 p refs
(Contract NASr-0)
(NASA-CR-56532) OTS: $3.60 ph

Modifications of the medium have been made that decrease the quantities of complex constituents. This has been done by using yeast extract and peptone at concentrations of one-half those initially used and by completely removing the amino acid hydrolysate from the medium. These changes do not affect the present test cultures adversely and may be better for some of the facultative autotrophic organisms. Studies of the effects of several antimetabolites have continued. Bard–Parker germicide can be heated at 135° C for 26 hours and still inhibit the range of test organisms without resulting in excessive sterile control levels. A working model of the instrument has been developed that is capable of functioning without attitude control. Mechanical aspects of the field tests with the new instrument have been satisfactory. The solid-state radiation detector used previously has been replaced with an anticoincident geiger detection system. Author

N64-22851 California U., Berkeley Lawrence Radiation Lab. Donner Lab. and Donner Pavilion
BIOLOGY AND MEDICINE Semiannual Report, Fall 1963
John H. Lawrence and Tove Neville, ed. [1963] 145 p refs
(Contract W-7405-ENG-48)
(UCRL-11184) OTS: $2.75

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N64-22852 California U., Berkeley Lawrence Radiation Lab.

ALLELIC MAPPING IN YEAST USING X-RAY-INDUCED MITOTIC REVERSION

Thomas R. Manney and Robert K. Mortimer *In its* Biol. and Med. [1963] p 1-5 refs (See N64-22851 16-16) OTS: $2.75

A new method for determining the sequence of mutational sites is based on the linear dose-effect relation for X-ray induction of allelic recombination in Saccharomyces cerevisiae. Mutations at two loci were mapped by this method. The use of X-rays simplifies allelic mapping and greatly increases its sensitivity. Author

N64-22853 California U., Berkeley Lawrence Radiation Lab.

EFFECT OF ERYTHROPOIETIC STIMULATION ON MARROW DISTRIBUTION IN MAN, RABBIT AND RAT AS SHOWN WITH Fe^{59} AND Fe^{52}

Donald Van Dyke, Hal O. Anger, and Myron Pollycove *In its* Biol. and Med. [1963] p 6-19 refs (See N64-22851 16-16) (Sponsored in part by AEC) OTS: $2.75

Distribution of marrow within the skeleton has been determined in man, rabbits, and rats by in vivo labeling of the marrow compartment with radioiron and, depending on the resolution required, either by assaying each bone separately for radioactivity or by obtaining a gamma-ray image of the distribution of the marrow by whole-body scanner or with the positron scintillation camera. The positron scintillation camera provides an excellent method for qualitative evaluation of the marrow distribution. The camera has sufficient resolving power to give a good picture of the distribution of marrow with Fe^{52} in a skeleton as small as that of the rat. The distribution apparent from the positron pictures has been confirmed by complete skeletal analysis of individual bones. Author

N64-22854 California U., Berkeley Lawrence Radiation Lab.

SOME PROPERTIES OF SERUM FROM RABBITS IMMUNIZED WITH HUMAN URINARY ERYTHROPOIETIN

John C. Schooley and Joseph F. Garcia *In its* Biol. and Med. [1963] p 20-36 refs (See N64-22851 16-16) OTS: $2.75

Sera obtained from rabbits after immunization with human urinary ESF can neutralize the biological activity of human urinary, sheep, rat, and rabbit plasma ESF. Such sera can depress erythropoiesis in normal mice. The neutralizing ability of such sera is found in the γ globulins. The finding that absorptions of the immune sera with a wide variety of proteins did not alter the neutralizing ability suggests that considerable immunological specificity is involved in the neutralization reaction. The injection or addition of antisera against proteins or protein hormones known to be of importance in normal erythropoiesis has little or no effect on the ability of exogenous ESF to stimulate erythropoiesis in polycythemic mice. These properties of the immune sera are consistent with the concept that the neutralization of the biological activity of ESF by anti-ESF is the result of an immunological reaction. The availability of such immune sera offers a potent tool for investigating many of the current problems on the role of ESF in the regulation of erythropoiesis. Author

N64-22855 California U., Berkeley Lawrence Radiation Lab.

ELECTROPHORETIC BEHAVIOR OF OsO_4-FIXED AND $KMnO_4$-FIXED RAT ERYTHROCYTES

Robert M. Glaeser (Ph.D. Thesis) and Howard C. Mel *In its* Biol. and Med. [1963] p 37-50 refs (See N64-22851 16-16) (Sponsored by AEC)
(UCRL-10898) OTS: $2.75

Mobility-pH curves at ionic strength 0.145 and mobility-ionic strength curves at pH 7.3 are reported for OsO_4-fixed, $KMnO_4$-fixed and unfixed rat RBC. OsO_4 fixation imparts great stability to the RBC, permitting extension of mobility

measurements down to pH 0.9 and up to pH 12.3. The pH-mobility curves for OsO_2-fixed and for unfixed cells are identical over the entire range for which data can be obtained for unfixed RBC. Both types are isoelectric at pH 1.6. The OsO_4-fixed cells reversibly acquire a positive charge below pH 1.6, and acquire an increased (negative) mobility above pH 11.0. These two new features are believed to represent intrinsic properties of the normal unfixed RBC. The entire extended mobility-pH curve appears consistent with the idea that outer-surface sialic acid (N-acylated neuraminic acid) is solely responsible for their charge (electrophoretic) characteristics. $KMnO_4$-fixed RBC show considerably altered pH-mobility (hence surface) characteristics, compared with OsO_4-fixed and unfixed RBC. This is ascribed to differences in chemical reactivity of OsO_4 and $KMnO_4$. Mobilities of both kinds of fixed cells are virtually identical at all ionic strengths at pH 7.3 but are lower than those of the unfixed cells at lower ionic strengths. Author

N64-22856 California U., Berkeley Lawrence Radiation Lab.

RAPID CONTINUOUS ELECTROPHORETIC CONCENTRATION OF DILUTE PROTEIN SOLUTIONS

Howard C. Mel, Hans F. Loren, and Joan Manning (California U., San Francisco) *In its* Biol. and Med. [1963] p 51–54 refs (See N64-22851 16-16)

(Sponsored by AEC) OTS: $2.75

Stable-flow free-boundary (STAFLO) electrophoresis was used for concentrating dilute separated fractions of serum proteins while the macromolecules remained in unheated aqueous solution and did not contact foreign surfaces or organic solvents. A concentration factor of 10.1 was achieved, with recovery of 96.3% of the input solute in the first two fractions. D.E.W.

N64-22857 California U., Berkeley Lawrence Radiation Lab.

CONTINUOUS FREE-FLOW FRACTIONATION OF CELLULAR CONSTITUENTS IN RAT BONE MARROW

Howard C. Mel, Linda T. Mitchell, and Bo Thorell (Karolinska Inst.) *In its* Biol. and Med. [1963] p 55–68 refs Based in part on a talk presented at the Conf. on Bone Marrow Transplantation and Irradiation Protect., Atlantic City, 16 Apr. 1963 (See N64-22851 16–16)

(Sponsored by AEC) OTS: $2.75

A single-cell suspension of normal rat bone marrow is prepared mechanically. This suspension is continuously fractionated in free solution, under sedimentation rate conditions, using 1 g only. With a sample flow of 2.2×10^6 cells/min and a 32-min steady-state residence time in the stable-flow free-boundary (STAFLO) flow-cell, the cells exit almost entirely into 7 of the 12 collection bottles. Maximum numbers of different cell types are observed, with good repeatability, in approximately descending order from top to bottom as follows: erythrocytes, erythroblasts, "immatures," myelocytes, and mature granulocytes. Major changes are effected relative to the starting marrow composition, and very large relative enrichments are achieved for certain cell types. Author

N64-22858 California U., Berkeley Lawrence Radiation Lab.

SCINTILLATION CAMERA WITH 11-INCH CRYSTAL

Hal O. Anger *In its* Biol. and Med. [1963] p 69–85 refs (See N64-22851 16-16) OTS: $2.75

The scintillation camera is a sensitive electronic instrument that produces pictures of the distribution of gamma ray and positron emitting isotopes. It consists of the following: (1) a collimator for producing a gamma-ray image of the subject; (2) a large, flat, sodium iodide crystal that transforms the gamma-rays into a pattern of scintillations; (3) a hexagonal array of phototubes spaced a short distance away from the crystal; (4) a computing circuit that determines the position and the brightness of scintillations in the crystal; (5) a pulse-height selector; (6) a cathode-ray oscilloscope that receives signals from the computing circuit and reproduces the desired scintillations as bright points of light in their proper locations on the cathode-ray tube; and (7) an optical camera for recording these flashes of light as dots on photographic film. It has been used to localize tumors, to show the shape, size, and location of organs, and to illustrate and measure functions of organs in human subjects. It sensitivity is 3 to 20 times that of mechanical scanners with focused collimators, and permits a reduction in isotope dosage or in the examination time. D.E.W.

N64-22860 California U., Berkeley Lawrence Radiation Lab.

INTERRELATIONSHIPS BETWEEN SERUM LIPIDS, SERUM LIPOPROTEINS AND LIPOPROTEIN COMPOSITION

Frank T. Lindgren, Norman K. Freeman, and Robert D. Wills *In its* Biol. and Med. [1963] p 91–97 refs (See N64-22851 16–16) OTS: $2.75

The interrelationships between the low-density lipoproteins and the total serum level of the commonly measured lipids (total lipid, total cholesterol, phospholipid, and glycerides) were evaluated for 32 normal males (ages 35 to 49 years). A most striking relationship ($r = 0.99$) was observed between the level of the S_f 20×10^5 (very low-density lipoproteins) and total serum glyceride. Chemical-composition studies indicated that the level of the S_f 20×10^5 lipoproteins (or total serum glyceride) was positively correlated with the percentage composition of glyceride in two lipoprotein classes—the S_f 0×20 and the HDL_{2+3} lipoprotein class. The highest degree of correlation ($r = 0.90$) was observed for the high-density lipoproteins, suggesting their potential importance in the transport and metabolism of glycerides. Author

N64-22861 California U., Berkeley Lawrence Radiation Lab.

AN IMPROVED METHOD FOR THE COMPUTER ANALYSIS OF GAS-LIQUID CHROMATOGRAMS

Alicia M. Ewing, Pamela P. Walker, Robert D. Wills, and Frank T. Lindgren *In its* Biol. and Med. [1963] p 98–103 refs (See N64-22851 16–16)

(Grants HE G-01882-09; HE G-02029-08) OTS: $2.75

An improved method for the computer analysis of gas-liquid chromatograms is presented. The analytical results are presented in terms of the relative mass, relative retention time, and percentage composition of each component of the chromatogram. In addition, the procedure provides for the optional calculation of absolute mass, correction of calibration factors, peak-height correction for unresolved components, and subtraction of contaminating components from each chromatogram. Author

N64-22862 California U., Berkeley Lawrence Radiation Lab.

INFRARED MICROMETHOD FOR SERUM TRIGLYCERIDES AND CHOLESTERYL ESTERS

Norman K. Freeman *In its* Biol. and Med. [1963] p 104–109 refs (See N64-22851 16–16) OTS: $2.75

Further experience with an infrared spectrophotometric method for the determination of serum triglycerides and cholesteryl esters is reported. Two new aspects considered are the use of a single-step combined extraction and adsorption procedure, and the feasibility of analyzing 0.05-ml serum samples. The simplified extraction, in comparison with the two-step procedure, is substantially equivalent in accuracy and slightly poorer in precision. Author

N64-22863 California U., Berkeley Lawrence Radiation Lab.
OSMIUM TETROXIDE-TRIGLYCERIDE INTERACTION AS A FUNCTION OF DEGREE OF UNSATURATION. AN X-RAY FLUORESCENCE STUDY
Thomas L. Hayes and James N. Hawkins *In its* Biol. and Med. [1963] p 110-112 refs (See N64-22851 16-16) OTS: $2.75

A quantitative determination of the amount of osmium found in triglycerides, following a 1/2-hr reaction with 1% buffered osmium tetroxide, showed that the amount of osmium is approximately proportional to the number of double bonds found in the molecule. Author

N64-22864 California U., Berkeley Lawrence Radiation Lab.
LIPID TRANSFER BETWEEN HUMAN HIGH-DENSITY AND S_f 20-10^5 LIPOPROTEINS
Alex V. Nichols and Lester Smith *In its* Biol. and Med. [1963] p 113-120 refs (See N64-22851 16-16)
(Grant HE G-02029-09) OTS: $2.75

Transfer of S_f 20 × 10^5 glyceride to human serum high-density lipoproteins occurs during incubation of serum with S_f 20×10^5 lipoproteins. Uptake of glyceride by HDL is associated with reciprocal reductions in HDL cholesterol ester content. An artificial lipid emulsion, Ediol, also transfers glyceride to HDL and displaces HDL cholesterol esters. The amount of glyceride transferred per amount Ediol glyceride added to incubation system is significantly less than observed for the S_f 20 × 10^5 glyceride. The implications of such glyceride transfer and cholesterol ester dislocation to lipoprotein chemistry are discussed. Author

N64-22865 California U., Berkeley Lawrence Radiation Lab.
USE OF THE BRAGG PEAK FOR BRAIN-TUMOR THERAPY
Alexander Gottschalk, John T. Lyman, and Larry W. Mc Donald *In its* Biol. and Med. [1963] p 121-127 refs (See N64-22851 16-16) OTS: $2.75

Three patients with brain tumors were treated by the Bragg peak of the 910-Mev alpha-particle beam from the 184-in. synchrocyclotron. All had had subtotal tumor resection prior to therapy. The case histories are presented; the technique of dosimetry and the method of irradiation are discussed. Author

N64-22866 California U., Berkeley Lawrence Radiation Lab.
WITH HIGH-ENERGY PARTICULATE RADIATION. II. SOME FACTORS AFFECTING RBE OF 730-MeV PROTONS
Charles A. Sondhaus, James K. Ashikawa, Cornelius A. Tobias, Vally Paschkes, and David Love *In its* Biol. and Med. [1963] p 128-135 refs (See N64-22851 16-16)
(Sponsored by NASA) OTS: $2.75

A series of seven experiments was performed with 730-Mev protons and with 100-kvp and 250-kvp X-radiation, and the relative lethality and time course of radiation injury were studied in more than 2,000 Swiss Webster white male mice. Results show that RBE values can differ between radiations of similar linear energy transfer (LET), even under uniform exposure geometry, when differences in dose-rate dependence and injury mode are present. Therefore, specification of the effect to which a proton exposure RBE applies is necessary, as is the introduction of a dose-rate factor in calculating RBE for exposures to low LET radiations. D.E.W.

N64-22868 California U., Berkeley Lawrence Radiation Lab.
SOME METRIC PROPERTIES OF THE SYSTEMS OF COMPARTMENTS
Aldo Rescigno and Giorgio Segre (Harvard U.) *In its* Biol. and Med. [1963] p 141-149 refs (See N64-22851 16-16)
(Sponsored in part by NASA and AEC) OTS: $2.75

Rules for the enumeration of the strong components of a graph and for the calculation of its variable adjacency matrix are presented. A new method is given, to calculate the transfer function of a graph, by analyzing the strong components of the graph, the elementary paths between two nodes, and linear subgraphs. Author

N64-22869 California U., Berkeley Lawrence Radiation Lab.
ON THE METABOLISM OF RADIOBROMIDE IN THE THYROID GLAND OF RATS
Gilles La Roche and Richard Brown *In its* Biol. and Med. [1963] p 150-156 refs (See N64-22851 16-16)
(Sponsored in part by NSF) OTS: $2.75

No evidence was found to support the hypothesis of bromine organification by the thyroid gland or serum of rats maintained on low-iodine diet up to 24 days. Radiobromide dosage did not significantly influence the concentrating ability of the thyroid gland or the amount of radiobromide in the sera as observed between groups B and C. The level of radiobromide present in the thyroid gland or serum, 24 hr after administration, may be dependent on sex or on the chronic effects of low iodine intakes. Author

N64-22879 Joint Publications Research Service, Washington, D.C.
USING FREQUENCY CHARACTERISTICS TO STUDY THE BODY TEMPERATURE REGULATORY SYSTEM OF WHITE RATS BEFORE AND AFTER COLD ADAPTATION
Cheng Lanying, Wang Yun-chiu, Chao Chin-mei, Chuan Tzu-sen, and Chiang Kuan-ch'ang *In its* Transl. on Communist China's Sci. and Technol. no. 87 26 May 1964 p 47-49 refs (See N64-22876 16-01) OTS: $1.25

Frequency characteristics are transfer functions used in engineering technology to measure linear regulatory systems and to determine the properties of a system. This article describes an experiment using the frequency characteristics method to quantitatively and dynamically describe the body-temperature system of white rats before and after adaptation. G.D.B.

N64-22936 National Aeronautics and Space Administration, Washington, D.C.
PROVISION FOR RADIATION SAFETY DURING THE FLIGHTS OF "VOSTOK-3" AND "VOSTOK-4" [OBESPECHENIYE RADIATSIONNOY BEZOPASNOSTI PRI POLETAKH KORABLEY "VOSTOK-3" I "VOSTOK-4"]

V. V. Antipov, Yu. I. Yefremov, M. D. Nikitin, I. A. Cavenko, and P. P. Saksonov Feb. 1964 8 p refs Transl. into ENGLISH from Kosmich. Issled., (USSR), v. 1, no. 2, 1963 p 303–308
(NASA-TT-F-8823)

Data are presented on the radiation environment in cosmic space before and during the group flight of the satellites Vostok 3 and Vostok 4, piloted by astronauts A. G. Nikolayev and P. R. Popovich. The characteristics of cosmic radiation are presented briefly. A description is given of the principal measures taken to provide for radiation safety during the group cosmic flight. Author

N64-22937 National Aeronautics and Space Administration, Washington, D.C.
THE DOSE OF COSMIC RADIATION IN THE BIOLOGICAL UNITS OF THE "VOSTOK-3" AND "VOSTOK-4" SPACECRAFT [DOZA KOSMICHESKOY RADIATSII V BIOBLOKAKH KOSMICHESKIKH KORABLEY "VOSTOK-3" I "VOSTOK-4"]
V. N. Lebedev, V. S. Morozov, G. F. Murin, M. D. Nikitin, and M. I. Salatskaya 1964 6 p refs Transl. into ENGLISH from Kosmich. Issled., (USSR), v. 1, no. 2, 1963 p 309–311
(NASA-TT-F-8824)

The dose of cosmic radiation was measured in special biological units of the Vostok 3 and Vostok 4 spacecraft by nuclear emulsions of type R and K, a scintillation photodosimeter, and X-ray film of type XX. As a result of these measurements, the total dose of cosmic radiation during the flight of Vostok 3 was 41 ± 6 millirads, and during the flight of Vostok 4 it was 30 ± 4 millirads. Author

N64-22940 National Aeronautics and Space Administration, Washington, D.C.
SPACE SUITS [SKAFANDR DLYA KOSMICHESKOGO POLETA]
F. Romanov May 1964 18 p Transl. into ENGLISH from Aviats. i Kosmonavt. (Moscow), no. 1 Jan. 1964 p 52–55
(NASA-TT-F-8852)

The space suit not only protects the astronaut from the atmosphere in the capsule in case any impurities should develop, but also protects him from overcooling after a parachute landing under low-temperature conditions, prevents the possibility of shock should the parachute drift into mountainous or wooded areas, and lends buoyancy in the case of a water landing. The space suit control system seals the suit, supplies it with oxygen, removes waste gases, and maintains the required gas medium temperature in the space suit. J.L.D.

N64-22941 National Aeronautics and Space Administration, Washington, D.C.
REACTION OF THE HUMAN AND ANIMAL CARDIOVASCULAR SYSTEM UNDER CONDITIONS OF WEIGHTLESSNESS [REAKTSIYA SERDECHNO-SOSUDISTOY SISTEMY CHELOVEKA I ZHIVOTNYKH V USLOVIYAKH NEVESOMOSTI]
R. M. Bayevskiy and O. G. Gazenko 1964 17 p refs Transl. into ENGLISH from Kosmich. Issled. (Moscow), v. 2, no. 2, 1964 p 307–319
(NASA-TT-F-8895)

Data are presented on the cardiovascular system, which were obtained during the flights of the second and third Vostok satellites. Reactions of the circulatory system were found to have a phase quality. Changes in cardiovascular function may be caused by decreased demands made by the body on the cardiovascular system under the conditions of weightlessness and by changes in nervous regulation. The data indicate that the level of myocardial function is lowered and that asynchronism develops in the activity of the right and left halves of the heart. It is concluded that the tone of the parasympathetic division of the autonomic nervous system increases during weightlessness. A discussion of the significance of blood circulation research in insuring the safety of spaceflights is included. Author

N64-23019 Wilmot Castle Co., Rochester, N.Y. Research Labs.
STUDIES FOR STERILIZATION OF SPACE PROBE COMPONENTS Progress Report no. 2, 1 Dec. 1963–1 Mar. 1964
Martin G. Koesterer [1964] 27 p refs
(Contract NASw-879)
(NASA-CR-56474) OTS: $2.60 ph

The current research activities that were continued or initiated include the following: (1) studies on the dry-heat resistance of microorganisms entrapped from air, added to sterile kaolin, in various gaseous atmospheres, and in activated carbon; and (2) studies that were initiated on the sterilization of components. N.E.A.

N64-23042 National Aeronautics and Space Administration, Washington, D.C.
EFFECT OF SPACE FACTORS DURING THE FLIGHT OF THE SATELLITES "VOSTOK 3" AND "VOSTOK 4" ON THE MICROSPORES OF *TRADESCANTIA PALUDOSA* [VLIYANIYE FAKTOROV KOSMICHESKOGO POLETA NA KORABLYAKH-SPUTNIKAKH "VOSTOK-3" I "VOSTOK-4" NA MIKROSPORY *TRADESCANTIA PALUDOSA*]
N. L. Delone, P. R. Popovich, V. V. Antipov, and V. G. Vysotskiy Feb. 1964 21 p refs Transl. into ENGLISH from Kosmich. Issled. (Moscow), v. 1, no. 2, Sep.–Oct. 1963 p 312–325
(NASA-TT-F-8825)

In experiments with microspores of Tradescantia, part of the material was fixed by P. R. Popovich, 56 hours after launching, and thus the effect of vibration and acceleration, which acted on the biological specimen during the descent of the ship, was eliminated. Analysis of the material obtained revealed a new type of rearrangement: spherical fragments that could be recorded not only in the metaphase, anaphase, and telophase, but also in the prophase and interphase. In addition, various impairments of mitosis were noted. Author

N64-23043 National Aeronautics and Space Administration, Washington, D.C.
EFFECT OF SPACE-FLIGHT FACTORS ON THE INCIDENCE OF SEX-LINKED RECESSIVE LETHAL MUTATIONS IN *DROSOPHILA MELANOGASTER* [VLIYANIYE FAKTOROV KOSMICHESKOGO POLETA NA CHASTOTU VOZNIKNOVENIYA STSEPLENNYKH S POLOM RETSESSIVNYKH LETHAL'NYKH MUTATSIY U *DROSOPHILA MELANOGASTER*]
Ya. L. Glembotskiy, Yu. A. Lapkin, G. P. Parfenov, and Ye. M. Kamshilova Feb. 1964 14 p refs Transl. into ENGLISH from Kosmich. Issled. (Moscow), v. 1, no. 2, Sep.–Oct. 1963 p 326–334
(NASA-TT-F-8826)

A description is given of the experiments conducted with the spaceships Vostok III and Vostok IV dealing with the effect of space-flight factors on mutations in *Drosophila melanogaster*. These data are compared with the results of similar experiments conducted during five previous space flights, which involved not only *Drosophila* but other specimens

as well (i.e., mice and seeds of various plants). Although these specimens reacted very differently to the conditions of different flights, a certain parallelism was observed in the heredity reaction of all of these specimens to the condition of each individual flight. It is hypothesized that such a situation results from the variation of the mutagenic effect of certain space-flight factors, i.e., weightlessness, rocket vibrations, acceleration, or cosmic radiation. Author

N64-23046 National Aeronautics and Space Administration, Washington, D.C.

CHANGES IN THE HARD DENTAL TISSUES AFTER REPEATED SMALL DOSES OF IONIZING RADIATION [IZMENENIYA TVERDYKH TKANEY ZUBA POSLE MNOGOKRATNOGO VOZDEYSTVIYA NA ORGANIZM MALYKA DOZ IONIZIRUYUSHCHEY RADIATSII

A. A. Prokhonchukov Mar. 1964 7 p refs Transl. into ENGLISH from Med. Radiol., (USSR), v. 2, no. 4, 1957 p 74–78

(NASA-TT-F-8851)

The condition of the hard dental tissues of rats after 28 to 36 irradiations by small doses (25 r) of X-rays was studied in experiments conducted with radioactive isotopes of phosphorus and calcium (P^{32} and Ca^{45}). It was revealed that changes in the phosphorocalcium metabolism depend on the total ionizing radiation dose. The phosphorocalcium metabolism is activated in the hard dental tissues of rats after irradiation by a total dose of 700 r. If the total dose is increased to 900 r, activation of the phosphorocalcium metabolism becomes pronounced. Disturbances of the mineral metabolism in the hard dental tissues reflect the general metabolic changes and the changes in the mineral metabolism of the whole body during radiation sickness. Author

N64-23051 National Aeronautics and Space Administration, Washington, D.C.

CAUSES FOR LETHALITY OF EMBRYONIC CELLS IN DROSOPHILA AFTER THE FLIGHTS OF THE VOSTOK 3 AND VOSTOK 4 SPACECRAFT [PRICHINY LETAL'NOSTI ZARODYSHEVYKH KLETOK U DROZOFILY POSLE POLETOV KOSMICHESKIKH KORABLEY-SPUTNIKOV "VOSTOK-3" I "VOSTOK-4"]

G. P. Parfenov Jun. 1964 9 p refs Transl. into ENGLISH from Kosmich. Issled. (Moscow), v. 2, no. 2, 1964 p 335–340

(NASA-TT-F-8898)

The results of some experiments on *Drosophila* carried out during the flights of the Vostok 3 and Vostok 4 are presented. In addition to new information on dominant lethal mutations in males, data are presented on the frequency of this type of mutation in females; it is shown that the frequency of dominant lethals does not increase in male gametes. The slight increase in the number of dead eggs in the experimental groups is ascribed to a reduction in the vigor of male sexual behavior after the space flights. The increase in dominant lethals observed in male gametes was not caused by radiation. Author

N64-23063 Joint Publications Research Service, Washington, D.C.

***VESTNIK* OF USSR ACADEMY OF MEDICAL SCIENCES, VOL XIX, NO. 4, 1964**

22 Jun. 1964 73 p refs Transl. into ENGLISH of Vestnik Akad. Med. Nauk SSSR (Moscow), v. 19, no. 4, 1964 p 3–104 (JPRS-25208; OTS-64-31540) OTS: $3.00

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N64-23098 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

A NORMAL DAY IN THE LIFE OF OUR COSMONAUTS

A. Aleksandrov 27 Feb. 1964 6 p Transl. into ENGLISH from Krasnaya Zvezda (Moscow), no. 288 (12198), 8 Dec. 1963 p 4

(FTD-TT-64-66/1; AD-433541)

This is a nontechnical article describing the activities of Soviet cosmonauts in the course of a day of physical and mental training. G.D.B.

N64-23109 Aerospace Medical Div. Arctic Aeromedical Lab., Fort Wainwright, Alaska

EFFECT OF COLD EXPOSURE ON THE ACTION OF MORPHINE IN RATS AND MICE

E. L. Way and H. W. Elliott Nov. 1963 28 p refs

(Contract AF 41(657)-413)

(AAL-TDR-62-50; AD-434079)

Data are presented showing that cold adaptation diminishes the depressant effects of morphine on respiratory minute volume, oxygen consumption, and analgesia on the one hand, but enhances the toxicity of morphine on the other. Attempts to account for the difference in sensitivity between cold-adapted and nonadapted animals by measuring the conjugation, excretion, and distribution of morphine in vivo, and by determining its effect on the respiration of KCl-stimulated brain slices in vitro were unsuccessful. Author

N64-23117 National Aeronautics and Space Administration, Washington, D.C.

A NEW METHOD IN TREATMENT OF PAROXYSMAL, AURICULAR FIBRILLATION [A PAROXYSMALIS PITVARI FIBRILLATIO KEZELESENEK UJABB MODSZERE]

Erno Somlo Dec. 1963 6 p refs Transl. into ENGLISH from Orv. Hetilap (Budapest), v. 102, 23 Apr. 1961 p 783-785 (NASA-TT-F-8555)

In three patients having 56 attacks, the oral procaine amide-Quinaglute treatment successfully converted periodic attacks of auricular fibrillation into sinus rhythm. In the prevention of attacks, Quinaglute, which is absorbed faster than quinidine sulphate and is effective longer, is an improvement. It seems that the combined oral treatment will be useful also in paroxysmal supraventricular tachycardia. Author

N64-23133 National Aeronautics and Space Administration, Washington, D.C.

LATITUDINAL AND SEASONAL DISTRIBUTION OF THE DAILY MAXIMA AND MINIMA OF f_0F2 VALUES [O SHIROTNOM I SEZONNOM RESPREDELENI MAKSIMAL'NYKH: MINIMAL'NYKH SUTOCHNYKH ZNACHENIY f_0F2]

N. M. Boyenkova Jun. 1964 9 p refs Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 4, no. 1, 1964 p 174-178
(NASA-TT-F-9018)

The behavior of f_0F2_{max} and f_0F2_{min} as a function of the geographic latitude of the observation point is considered for three seasons: winter (January), equinox (March), and summer (July). There exists some type of inverse relationship between the position of the sun and f_0F2_{max} and f_0F2_{min} The values of f_0F2_{max} are a function of the angle of solar descent (i.e., a function of the solar altitude at midnight) and not a function of the solar altitude at noon as it should be. The values of f_0F2_{min} that are observed prior to the sunrise are a function of the solar altitude at noon. Thus, for f_0F2_{max} and f_0F2_{min} there exists approximately a half-day lag (more precisely, a 10- to 18-hr lag) with respect to the position of the sun. As a result, f_0F2_{max} is observed approximately at noon, but is a function of the angle of the solar descent taken at midnight. However, f_0F2_{min} is observed before sunrise (3:00 a.m. to 6:00 a.m.) but is a function of the solar altitude at noon. P.V.E.

N64-23204 National Aeronautics and Space Administration, Washington, D.C.

AN OUTLINE OF THE CLINICAL PHYSIOLOGY OF THE CIRCULATION

V. V. Parin and F. Z. Meyerson Jun. 1964 525 p refs Transl. into ENGLISH of the Book "Ocherki Klinicheskoy Fiziologii Krovoobrashcheniya" Moscow, Medgiz., 1960 (NASA-TT-F-173) OTS: $7.00

This book describes the principal problems of the physiology and pathology of the circulation. The discussion is extensively illustrated with references to the work of Soviet and foreign scientists and to the authors own experimental material. An attempt is made to give clinical physiology the status of an independent discipline. Author

N64-23255 Joint Publications Research Service, Washington, D.C.

THE EFFECT OF STRESS ON THE RADIOSENSITIVITY OF RATS AND THE EFFECTIVENESS OF THE RADIOPROTECTIVE ACTION OF MERCAMINE

P. D. Gorizontov and I. A. Rudakov 17 Jun. 1964 12 p refs Transl. into ENGLISH from Patol. Fiziol. i Eksperim. Terapiya (Moscow), v. 8, no. 2, Mar.-Apr. 1964 p 17-22
(JPRS-25130; OTS-64-31508) OTS: $0.50

All experiments were performed on rats of both sexes of the Wistar line whose weights were between 160 and 190 grams. The animals were irradiated with a dose of 700 r with the gamma-rays from a Co^{60} source (EGO-2 apparatus) with a dose rate of 263 r per minute. As a prophylactic agent, the rats were given an intraperitoneal injection of mercamine 15 minutes before irradiation in a dose of 100 mg/kg. Electrical stimulation was performed as follows: duration of one pulse, 2 seconds; interval, one minute; current, 2 mo; frequency, 2,000 cps. The change in the nonspecific resistance of the body caused by the action of stimulus alters the sensitivity of the body to the action of ionizing radiation. Mortality does not change. Mercamine as a radioprotective substance is most effective in the stage of resistance though without effect in the initial stage of exhaustion. A.W.

N64-23257 Joint Publications Research Service, Washington, D.C.

PROBLEMS OF LABOR HYGIENE IN PRODUCTION OF METALLIC THALLIUM AND ITS SALTS

T. S. Tikhov 22 Jun. 1964 11 p refs Transl. into ENGLISH from Gigiena i Sanit. (Moscow), v. 29, no. 2, Feb. 1964 p 23-27
(JPRS-25206; OTS-64-31539) OTS: $0.50

Experiments were conducted to determine effects of thallium and its compounds on workers. It was established that thallium is a polystemic poison possessing polytropic action. It is present in the form of solutions, in coarsely dispersed dust, in aerosols, and in dust of slats and alloys, and enters the human organism through skin contamination and/or respiratory organs. Preliminary and periodic medical inspections are necessary to prevent the development of occupational disease through metallic thallium and its salts. A.W.

N64-23275 Philips Gloeilampenfabrieken, N.V., Eindhoven (Netherlands)

GRIDS TO REDUCE SCATTERED X-RAYS IN MEDICAL RADIOGRAPHY

W. Hondius Boldingh (Thesis—Eindhoven Technol. U.) 1964 93 p refs *its* Res. Rept. Suppl. no. 1

The relation between the constructional properties of X-ray grids and their contrast-improving capacity is discussed. Measurements of a number of grids of different construction, under various exposure conditions, by means of an electronic measuring equipment and a water phantom are described and discussed. The importance of the lead content is stressed, and two new specification values are introduced: the focus-grid distance limits and the contrast-improvement factor, which enable a rational choice of grids for various fields of application. A proposition is given for standardization of exposure tables, as far as indications for the use of grids is concerned, based on the contrast-improvement factor. The compensation of the increase of exposure times and doses due to the use of grids, by an increase of the voltage across the X-ray tube, is quantitatively analyzed. Author

N64-23278 Brandeis U., Waltham, Mass.

INDUCIBLE PHAGES OF *BACILLUS SUBTILIS*

Edna Seaman, Elaine Tarmy, and Julius Marmur (Albert Einstein Coll. of Med.) Repr. from Biochemistry, v. 3, no. 5, May 1964 p 607-613 refs *Its* Publ. No. 282
(Grant NsG-375)

A group of prophages induced in *Bacillus subtilis* were studied. The evidence presented indicates that these phages are genetically defective. DNA isolated from the phages exhibits many properties that are similar to host DNA, and is capable of transforming *B. subtilis* with respect to host genetic markers. Author

N64-23295 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
CHOICE OF SAFETY FACTOR AND COMPUTATION IN DESIGNING ELECTROMAGNETIC MECHANISMS OF A REQUIRED DEPENDABILITY
Ya. A. Rips 18 Mar. 1963 16 p refs Transl. into ENGLISH from Elektrichestvo (Moscow), no. 4, 1961 p 76–81
(FTD-TT-63-37/1+2; AD-402441)

The problem of designing dependable and safe electromagnetic mechanisms was investigated. The mathematical and engineering methods recommended are illustrated by using them in the design of a d.c. electromagnetic relay with a given operational safety and dependability. R.T.K.

N64-23296 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
CHEMISTRY OF BLUE-GREEN ALGAE (CYANOPHYCEAE)
G. K. Barashkov 8 Mar. 1963 p 18 refs Transl. into ENGLISH from Botan. Zh., Akad. Nauk SSSR (Leningrad), v. 46, no. 3, 1961 p 447–454
(FTD-TT-63-193/1; AD-400516)

Bluish green algae are usually distributed in fresh water. In recent years many investigations dealing with the photosynthesis and mineral nutrition of these algae, as well as problems related to their physiology, have been made and are discussed. The knowledge of the chemistry of algae is reviewed as a basis for a better understanding of the processes occurring in them and for proper evaluation of their role in nature. R.T.K.

N64-23308 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
THE BIOCHEMICAL BASES FOR DEVELOPING PRODUCTS OF HIGHER BIOLOGICAL VALUE
A. A. Pokrovskiy 13 Apr. 1964 28 p refs Transl. into ENGLISH from Voprosy Pitaniya (Moscow), v. 23, no. 1, Jan.–Feb. 1964 p 3–16
(FTD-TT-64-148/1+4; AD-438226)

The need for a well-balanced diet to effectively assimilate food elements is stated, with particular emphasis on the amino acids. The following are discussed and tabulated: (1) average minimum daily amino acid requirements for humans; (2) tryptophan and threonine requirements in the essential amino acids; (3) amounts of amino acids and fats in most important food products; and (4) amino acid content of belips (protein products made by a combination of cod, fresh cottage cheese, and sunflower oil). The use of proteins in medicinal feeding is discussed briefly. E.K.R.

N64-23309 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
EXPERIMENTAL INVESTIGATIONS IN COSMIC PHYSIOLOGY
P. V. Vasil'yev, A. D. Voskresenskiy, and O. G. Gazenko 16 Jul 1963 15 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 1, 1963 p 15–23
(FTD-TT-63-719/1+2; AD-416781)

Man's ability to endure lateral and transverse accelerations in space flight is discussed from the point of view of hemodynamics. E.K.R.

N64-23312 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
ANALYZING THE EFFECT OF PHYSICAL LOAD, HIGH TEMPERATURE OF THE MEDIUM AND HIGHER OXYGEN CONTENT IN INHALED AIR ON THE EXCITABILITY OF HUMAN VISUAL ANALYZER
A. O. Navakatikyan, V. V. Lebedeva, I. N. Blageveschenskaya, and S. A. Pevnyy 3 Dec. 1963 14 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (Moscow), v. 49, no. 9, 1963 p 1036–1043
(FTD-TT-980/1+2; AD-427261)

The effect of a combination of conditions, characteristic of mine rescue operations (temperatures of surrounding medium, physical strains, and inhalation of gaseous mixtures with high oxygen content) on the vision of humans was investigated. The results of the experiments that were performed in a thermal chamber on two groups of subjects, miners and students, are presented. R.T.K.

N64-23335 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
SOME RESULTS AND PROBLEMS IN THE FIELD OF SPACE RADIOBIOLOGY
P. P. Saksonov, V. V. Antunov, and N. N. Dobrov 23 Mar. 1964 14 p refs Transl. into ENGLISH from Vestnik Akad. Med. Nauk SSSR (Moscow), no. 8, 1963 p 13–20
(FTD-TT-64-33/1+2+4; AD-435994)

The influence of cosmic radiation on both the vital activity and heredity of biological organisms was studied. Monitoring dosimeters were set up onboard spaceships. The cosmonauts were also supplied with various kinds of personal dosimeters. Various biological objects were also put in the spaceships—lysogenic bacteria, cultures of HeLa cells, fruit flies, plant seeds, racemes of *Tradescantia paludosa*, fertilized eggs, and ascarid eggs. According to the dosimeters, Nikolaev received a dose of 0.5 rem and Popovich about 0.4 rem. At the same time, the results obtained on the biological organisms indicate a biological effect somewhat in excess of that anticipated from the recordings of the physical dose of cosmic radiation. The cosmic radiation dose during the entire time of the flight, as recorded by the physical and biological objects, did not adversely affect the cosmonauts. R.T.K.

N64-23365 Lockheed Missiles and Space Co., Sunnyvale, Calif.
IONIZING RADIATION EFFECTS ON PERFORMANCE CAPABILITIES OF ASTRONAUTS: AN ANNOTATED BIBLIOGRAPHY
Eugene E. Graziano, comp. Nov. 1963 41 p refs
(SRB-63-13)

This selective bibliography consists of 82 references to literature specifically relating to ionizing radiation effects on human space travelers. Immediate and long-range effects on the eyes, and other tissues vital to optimum performance capabilities, were of special interest; antiradiation drugs were also of interest. The period covered in the search was from January to November 1963. Author

N64-23366 Joint Publications Research Service, Washington, D.C.
STUDIES IN TOXICOLOGY
17 Jun. 1964 34 p refs Transl. into ENGLISH of 4 Articles from Gigiena Truda i Prof. Zabolevaniya (Moscow), v. 8, no. 4, Apr. 1964 p 19–29, 57–62
(JPRS-25116; OTS-64-31498) OTS: $1.00

CONTENTS:

1. SIGNIFICANCE OF THE CONCEPTS OF "TWO-PHASE TOXICITY" AND "THERMODYNAMIC ACTIVITY" IN TOXICOLOGY N. V. Lazarev and W. A. Filov p 1-9 refs (See N64-23367 16-16)

2. INVESTIGATIONS OF THE EFFECT OF VANADIUM TRIOXIDE DUST ON THE ORGANISM I. V. Roshchin, A. V. Il'nitskaya, La. A. Lutsenko, and L. V. Zhidkova p 10-18 refs (See N64-23368 16-16)

3. TOXIC PROPERTIES OF GERMANIUM TETRACHLORIDE I. N. Kal'sada p 19-26 refs (See N64-23369 16-16)

4. TOXICOLOGY OF AMINES OF THE HIGHER ALIPHATIC SERIES (16—20 CARBON ATOMS) N. G. Demeshkevich p 27-31 (See N64-23370 16-16)

N64-23367 Joint Publications Research Service, Washington, D.C.

SIGNIFICANCE OF THE CONCEPTS OF "TWO-PHASE TOXICITY" AND "THERMODYNAMIC ACTIVITY" IN TOXICOLOGY

N. V. Lazarev and V. A. Filov *In its* Studies in Toxicol. 17 Jun. 1964 p 1-9 refs (See N64-23366 16-16) OTS: $1.00

The concepts of two-phase toxicity and thermodynamic activity are related to one another in a definite manner. The first concept makes it possible to predict the actual danger of acute poisoning with volatile substances and to plot a comparative scale of such actual danger for substances during their free evaporation. The second concept opens possibilities for predicting the force of the narcotic action of the nonstudied members of a series on the basis of members that have been studied. In addition, the concept of the activity can be utilized for the approximate classification of substances by type of their narcotics action. P.V.E.

N64-23368 Joint Publications Research Service, Washington, D.C.

INVESTIGATIONS OF THE EFFECT OF VANADIUM TRIOXIDE DUST ON THE ORGANISM

I. V. Roshchin, A. V. Il'nitskaya, L. A. Lutsenko, and L. V. Zhidkova *In its* Studies in Toxicol. 17 Jun. 1964 p 10-18 refs (See N64-23366 16-16) OTS: $1.00

An experimental study of the action of vanadium trioxide dust is discussed. The investigation included a study of the physical properties of the dust, establishment of the average lethal dose, and a study of the nature of the toxic action of the aerosol in continuous experiments with rabbits. P.V.E.

N64-23369 Joint Publications Research Service, Washington, D.C.

TOXIC PROPERTIES OF GERMANIUM TETRACHLORIDE

I. N. Kal'sada *In its* Studies in Toxicol. 17 Jun. 1964 p 19-26 refs (See N64-23366 16-16) OTS: $1.00

The vapors of germanium tetrachloride have a sharp suffocating odor, and they irritate the mucous membranes of the respiratory passages and the conjunctiva of the eye. A study of germanium tetrachloride was conducted in three areas: (1) clarification of the toxicity of the compound during a static, single exposure, by observation of the clinical symptoms of the poisoning through determination of weight coefficients and through pathomorphological investigation of the organs; (2) investigation of the action of small concentrations of germanium tetrachloride under conditions of dynamic exposure, by observation of the general condition of the organs and through investigation of the dynamics of the organ weight and by pathomorphological studies of the organs; and (3) local action of the compound on the integuments and the eye. P.V.E.

N64-23370 Joint Publications Research Service, Washington, D.C.

TOXICOLOGY OF AMINES OF THE HIGHER ALIPHATIC SERIES (16–20 CARBON ATOMS)

N. G. Demeshkevich *In its* Studies in Toxicol. 17 Jun. 1964 p 27-31 (See N64-23366 16-16) OTS: $1.00

Preliminary data are presented that were obtained from experiments in which a mixture of higher aliphatic amines with 16 to 20 carbon atoms were introduced into the stomach and applied to the skin of aminals (mice, rats, and rabbits). The amines used were as follows: hexadecylamine, $CH_3(CH_2)_{15}NH_2$; heptadecylamine, $CH_3(CH_2)_{16}NH_2$; octadecylamine, $CH_3(CH_2)_{17}NH_2$; nonandecylamine, $CH_3(CH_2)_{18}NH_2$; and eicosylamine, $CH_3(CH_2)_{19}NH_2$. P.V.E.

N64-23377 National Inst. of Mental Health, Bethesda, Md. Lab. of Neurobiology

A COMPARISON BETWEEN AUTONOMIC AND SOMATIC MOTOR OUTFLOW TO VESTIBULAR STIMULATION

Bo E. Gernandt (NASA. Ames Res. Center) Repr. from Confin. Neurol. (Basel), v. 24, 1964 p 140-157

(NASA-RP-215)

Reported is an investigation designed to compare the effects of removal of various tonic inhibitory sources upon the activity invoked by vestibular stimulation while recording simultaneously from the vagus nerve and spinal motor neurons. Discussed also are the results of a search for phasic control of autonomic activity evoked by vestibular stimulation. N.E.A.

N64-23391 Communication Research Inst., Miami, Fla.

BASIC RESEARCH ON BIOLOGICAL COMMUNICATION Progress Report, 1 Jul. 1962–31 Jan. 1964

John C. Lilly 1964 16 p

(Grant NsG-278-62)

(NASA-CR-53228) OTS: $1.60 ph

Experiments were designed to test the communication capabilities of *Tursiops truncatus*, an organism with a very large central nervous system. Investigations have been initiated on the natural underwater productions and of the elicited airborne sounds. The orientation that has gradually evolved is that of seeking physically specifiable aspects of sonic exchanges between organisms. The advantage of physically specifiable variables is that no psychophysical judgments are necessary to obtain agreement as to certain aspects of the observed phenomena. The major effort in this project has been to explore several such physical variables. Author

N64-23392 Esso Research and Engineering Co., Linden, N.J.

DEVELOPMENT OF HYDROCARBON ANALYSES AS A MEANS OF DETECTING LIFE IN SPACE Annual Report

W. G. Meinschein 1 Jan. 1964 10 p refs

(Contract NASw-508)

(NASA-CR-53096) OTS: $1.10 ph

Extensive data are being acquired on biological, sedimentary, and abiotic alkanes. More than 300 GLC chromatographic "fingerprints," 100 mass spectra, and many infrared and ultraviolet spectra of naturally occurring hydrocarbons have been catalogued. These data indicate that biotic hydrocarbons are readily distinguishable from adiotic alkanes. Benzene extracts of elimination products and of Recent sediments contain comparable percentages of alkanes. These percentages usually exceed greatly the concentrations of alkanes in biological lipids but are significantly less than the concentrations of alkanes in ancient sediment extracts or crude oils. Paraffinic hydrocarbons from living things, fecal matter,

and sediments have similar structures and optical properties. Analyses of alkanes of various geologic ages show that different types of biological alkanes can apparently keep their characteristics for more than a billion years in terrestrial environments. Author

N64-23393 George Washington U., Washington, D.C.
EXOBIOLOGY Annotated Bibliography, 1951–1964
Joe W. Tyson and Ruby W. Moats, comp. Mar. 1964 78 p refs
(Grant NsG-485)
(NASA-CR-53806) OTS: $7.60 ph

This annotated bibliography on exobiology includes descriptions of planetary environments, speculations on the existence of life and the forms that life may assume under such conditions, and mechanisms for the discovery of life forms (remote sensing). It is based to a large extent on considerations of chemical and biological evolution on the planet earth. Author and subject indexes are provided. R.T.K.

N64-23428 Air Forece Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
DATA FROM THE CONFERENCE DEALING IN METHODS OF PHYSIOLOGICAL INVESTIGATIONS OF HUMAN BEINGS (SELECTED ARTICLES)
10 Dec. 1963 62 p Transl. into ENGLISH from Materialy Konferentsii po Metodam Fiziol. Issled. Cheloveka, Inst. Gigieny Tr. i Profzabolevaniy AMN SSSR, Moskovskoye Obshchestvo Fiziologon, 1962 p 12, 15–23, 32–36, 40–42, 65–68, 83–85, 88–89, 98–108, 163–165, 186–194, 199–202, and 207 (FTD-TT-63-916/1; AD-427298)

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1. MATHEMATICAL DIFFERENTIATION OF CARDIOLOGICAL CHARACTERISTICS Ye. B. Babskiy and V. L. Karpamn p 1–2
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3. PRINCIPLES OF METHODICAL APPROACH TO THE STUDY OF HUMAN TYPES OF HIGHER NERVOUS ACTIVITY Z. I. Biryukova p 12–14
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6. RADIOTELEMETRIC INVESTIGATIONS OF HEART BEAT FREQUENCY AT SPORTS ACTIVITIES A. V. Vasilyeva p 17–18
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8. EMPLOYMENT OF ELECTROENCEPHALOGRAPHY IN HYGIENIC INVESTIGATIONS AND METHODS OF ANALYZING SAME A. M. Volkov p 20–21
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11. VECTOR ANALYSIS OF DYNAMOCARDIOGRAMS L. A. Ioffe p 25–27
12. METHOD OF ELECTROMETRIC DETERMINATION OF OXYGEN IN EXHALED AIR OF HUMANS L. A. Isaakyan and V. A. Tarasov p 27–28
13. QUANTITATIVE METHODS OF INVESTIGATING HUMAN MUSCULAR TONUS Ya. M. Kots p 28–35
14. THE VELODYNAMOMETER L. G. Kuchin p 36–36
15. DYNAMOMETRIC BICYCLE PEDALS L. G. Kuchin p 36–37
16. COMPLEX INSTALLATION FOR STUDYING COORDINATIONS OF MOVEMENTS WHEN TURNING BICYCLE PEDALS L. G. Kuchin p 37–40
17. RADIOTELEMETRIC METHOD OF EXAMINING SPORTSMEN S. P. Sarychev p 40–42
18. REMOTE REGISTRATION BY THE METHOD OF TELEMETERING RESPIRATION, PULSE, EGG. I. I. Semernin and V. S. Sidorenko p 42–43
19. METHODICAL PROBLEMS OF PHYSIOLOGICALLY INVESTIGATING LABOR ACTIONS WITH CONTROL SYSTEMS V. S. Farfel' p 43–45
20. ON METHODS OF STUDYING MOVEMENTS, ASSURING URGENT INFORMATION ABOUT THE MEASURED PARAMETERS V. S. Farfel' p 45–49
21. NEW SOUND ABSORBING EAR MUFFS AND METHOD OF INVESTIGATING THEIR EFFECTIVENESS A. V. Chapek and V. V. Ushakov p 49–51
22. ABOUT CERTAIN METHODS OF INVESTIGATION DIURNAL PERIODICITY OF PHYSIOLOGICAL FUNCTIONS OF THE ORGANISM OF CIVIL AVIATION FLIGHT PERSONNEL A. V. Chapek and I. M. Geller p 51–52
23. PROBLEMS OF EVALUATING MAN'S EXTERNAL RESPIRATION FUNCTIONS L. L. Shik p 53–57
24. ON HOW TO DETERMINE AND INCREASE THE RESISTANCE OF THE ORGANISM TO ROLLING BY THE METHOD OF RAPID HEAD MOVEMENTS A. I. Yarotskiy p 57–58

N64-23432 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
MICROBIOLOGY (SELECTED ARTICLES)
19 Nov. 1963 18 p refs Transl. into ENGLISH from Mikrobiologiya (Moscow), v. 32, no. 2, 1963 p 193–203
(FTD-TT-63-1009/1+2; AD-425809)

CONTENTS:

1. EFFECT OF LIGHT INTENSITY ON THE USE OF CO_2 AND ORGANIC COMPOUNDS DURING THE PHOTOSYNTHESIS OF CHLOROPSEUDOMONAS ETHYLICUM R. M. Baltiskaya and Ye. N. Kondratyeve p 1–9 refs (See N64-23433 16-16)
2. ON THE RELATIONSHIP BETWEEN THE PHYSIOLOGICAL STATE AND MEDIUM DURATION OF FLUORESCENCE OF BACTERIOCHLOROPHYLL IN CELLS OF PHOTOSYNTHESIZING BACTERIA A. B. Rubin and L. K. Osnitskaya p 10–15 refs (See N64-23434 16-16)

N64-23433 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
THE EFFECT OF LIGHT INTENSITY ON THE USE OF CO_2 AND ORGANIC COMPOUNDS DURING THE PHOTOSYNTHESIS OF CHLOROPSEUDOMONAS ETHYLICUM
R. M. Balitskaya and Ye. N. Kondratyeva *In its* Microbiology (Selected Articles), 19 Nov. 1963 p 1–9 refs (See N64-23432 16-16)

Use of organic compounds and carbon dioxide by *Chloropseudomonas ethylicum* varies in relation to light intensity. At low light intensities, the culture oxidizes ethanol into acetic acid and fixes CO_2 in equimolecular ratios. Upon an increase in light intensity, the ratio CO_2/C_2H_5OH rises gradually to 1.85, and the ratio CH_3COOH/C_2H_5OH drops to 0.23. The amount of consumed ethanol and CO_2 per 1 g of dry bacteria weight decreases with the increase in light intensity, which, apparently, is compensated by the use of

acetic acid by the culture in exchange. The use of glucose by the *Chloropseudomonas ethylicum* is accompanied by the formation in the medium of small CO_2 quantities at light intensities of approximately up to 25×10^3 erg/cm^2 sec. At a further increase in light intensity, the use of glucose by *Chloropseudomonas ethylicum* is not accompanied by formation or consumption of CO_2 from the medium. P.V.E.

N64-23434 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

ON THE RELATIONSHIP BETWEEN THE PHYSIOLOGICAL STATE AND MEDIUM DURATION OF FLUORESCENCE OF BACTERIOCHLOROPHYLL IN CELLS OF PHOTOSYNTHESIZING BACTERIA

A. B. Rubin and L. K. Osnitskaya *In its* Microbiology (Selected Articles), 19 Nov. 1963 p 10–15 refs (See N64-23432 16-16)

The mean duration of the singlet excited state of pigments in photosynthesizing bacteria was investigated in order to determine the effectiveness of photosynthetic deactivation of excited pigment molecules. P.V.E.

N64-23437 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

ON THE UNIVERSAL UNIT OF RADIATION DOSE

V. I. Ivanov 30 Dec. 1963 10 p refs Transl. into ENGLISH from Ob Universal'noy Edinitse Radiatsionnoy Dozy, Symposium on Biological Effects of Neutron Irradiations (USSR), 7–11 Oct. 1963 9 p

(FTD-TT-63-1050/1+2+4; AD-430126)

A universal value of the radiation dosage is introduced, which, at a biological dose of 1 rem, has the same value for any type of radiation regardless of its spectrum. A special feature of the radiation dose is that it depends only on the physical values determining the interaction between the radiation and the substance. The new magnitude dosage radiation is determined by the relationship, $\omega^* = \beta_1 \Delta E + \beta_2 \sqrt{\Delta E \, dE/dx}$, where ω^* is the radiation dosage; dE/dx is the average energy loss per unit pathway of a secondary particle, defined as the quotient from the division of the total energy of the particle divided by its path length; and β_1 and β_2 are constant coefficients selected so that the ω^* equals unity at a neutron dose of 1 rem. P.V.E.

N64-23444 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

RECORDERS IN ELECTROMEDICAL DIAGNOSTIC APPARATUS

B. N. Liushits and N. A. Solov'yev 23 Mar. 1964 10 p ref Transl. into ENGLISH from Elektron. V Med., Gosenergoizdat (Moscow), 1960 p 130–136

(FTD-TT-63-1195/1+2+4; AD-438825)

The recorder is one of the basic units of a clinical electromedical diagnostic apparatus. Recorders with photorecording from the screen of a cathode-ray or by means of electromechanical oscillographs are described. The characteristics of magnetoelectric and polarized electromagnetic recording systems are discussed. R.T.K.

N64-23454 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

HERALD OF THE ACADEMY OF SCIENCES OF THE USSR (SELECTED ARTICLES)

31 Jan. 1963 35 p Transl. into ENGLISH from Vestnik Akad. Med. Nauk SSSR (Moscow), no. 4, 1962 p 44–50, 65–70, 76–81

(FTD-TT-62-1164/1+2+4; AD-295282)

CONTENTS:

1. ADAPTIVE REACTIONS OF AN ORGANISM UNDER OCCUPATIONAL CONDITIONS A. A. Letavet p 1–12

2. EXPERIMENTAL BIOLOGY AND NEW CONCEPTS OF IMMUNOGENESIS N. N. Zhukov-Vereahnikov, I. N. Mayskiy, et al p 13–21 (See N64-23455 16-16)

3. POSSIBILITIES OF PROTECTIVE ADAPTATIONS OF AN ORGANISM AND THEIR LIMITS UNDER CONDITIONS OF MAXIMUM C-FORCES AND WEIGHTLESSNESS V. V. Parnin, et al p 22–32 (See N64-23456 16-16)

N64-23455 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

EXPERIMENTAL BIOLOGY AND NEW CONCEPTS OF IMMUNOGENESIS

N. N. Zhukov-Verezhnikov, I. N. Mayskiy, and G. P. Tribulev *In its* Herald of the Acad. of Sci. of the USSR (Selected Articles) 31 Jan. 1963 p 13–21 (See N64-23454 16-16)

Recent hypotheses dealing with the formation of antibodies are discussed. The mutation-clone theory of the formation of Burnet antibodies is considered in particular. P.V.E.

N64-23456 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

POSSIBILITIES OF PROTECTIVE ADAPTIONS OF AN ORGANISM AND THEIR LIMITS UNDER CONDITIONS OF MAXIMUM G-FORCES AND WEIGHTLESSNESS

V. V. Parnin, O. G. Gazenko, and V. I. Yazdovskiy *In its* Herald of the Acad. of Sci. of the USSR (Selected Articles) 31 Jan. 1963 p 22–32 (See N64-23454 16-16)

The effects of acceleration and weightlessness on man and other organisms are discussed. Various experiments involving animals are described. Also described are the effects of weightlessness noted in cosmonauts Gagarin and Titov. P.V.E.

N64-23463 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

HERALD OF THE ACADEMY OF MEDICAL SCIENCES OF THE USSR (SELECTED ARTICLES)

20 Feb. 1963 45 p Transl. into ENGLISH from Vestnik Akad. Med. Nauk SSSR (Moscow), no. 5, 1962 p 72–93

(FTD-TT-62-1548/1+2+4; AD-299646)

CONTENTS:

1. AN EXPERIMENT IN THE ANALYSIS OF PROTECTIVE ORGANIC FUNCTIONS BASED ON THEORETICAL CONCEPTS OF REGULATION AND PHYSIOLOGY B. I. Al'bertinskiy, G. S. Kan, and V. N. Chernigovskiy p 1–28 (See N64-23464 16-16)

2. GENERAL ADAPTATION REACTIONS IN AN ORGANISM EXPOSED TO HARMFUL STIMULI I. R. Petrov p 29–42 (See N64-23465 16-16)

N64-23464 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

AN EXPERIMENT IN THE ANALYSIS OF PROTECTIVE ORGANIC FUNCTIONS BASED ON THEORETICAL CONCEPTS OF REGULATION AND PHYSIOLOGY (INSTANCED BY TUBERCULAR INFECTION)

B. I. Al'bertinskiy, G. S. Kan, and V. N. Chernigovskiy *In its* Herald of the Acad. of Med. Sci. of the USSR (Selected Articles) 20 Feb. 1963 p 1–28 refs (See N64-23463 16-16)

The reaction of an organism to exposure to tubercular infection is examined, and the general laws of establishing defense mechanisms are discussed with respect to several

general concepts of physiology and control theory. It is concluded that postvaccinal immunity to tuberculosis in its physiological aspect is the result of the organism's active adaptation in relation to BCG (bacillus Calmette-Guérin) vaccine, and adaptation that leads to homeostasis disturbed by the original administration of vaccine. In its biological aspect, immunity is the result of transferring the organism in the process sustaining homeostasis to a new level of control. P.V.E.

N64-23465 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
GENERAL ADAPTATION REACTIONS IN AN ORGANISM EXPOSED TO HARMFUL STIMULI
I. R. Petrov *In its* Herald of the Acad. of Med. Sci. of the USSR (Selected Articles) 20 Feb. 1963 p 29–42 refs (See N64-23463 16-16)

Under the action of harmful stimuli during the rise and course of a disease two types of change are discovered—adaptive reactions and pathological changes, which are closely interconnected and represent a single complex characteristic of the given disease. Brief summaries of experiments are presented, indicating that these changes do occur. P.V.E.

N64-23608 National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
TOLERANCE TO VEHICLE ROTATION OF SUBJECTS USING TURNING AND NODDING MOTION OF THE HEAD WHILE PERFORMING SIMPLE TASKS
Ralph W. Stone, Jr. and William Letko New York, AIAA, [1964] 12 p refs Presented at the 1st AIAA Ann. Meeting, Washington, 29 Jun.–2 Jul. 1964
(AIAA Paper-64-218) AIAA: $0.50 members, $1.00 nonmembers

Turning and nodding motions by astronauts in flight, while performing simple tasks, may cause great discomfort. The relationship of acceleration and vehicle rotation to head and body motions creates problems that are discussed in the report. G.D.B.

N64-23609 National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
THE PILOT'S ROLE DURING MERCURY SYSTEMS FAILURES
John H. Boynton N.Y., AIAA [1964] 12 p refs Presented at the 1st AIAA Ann. Meeting, Washington, 29 Jun.–2 Jul. 1964 (AIAA Paper-64-222) AIAA: $0.50 members, $1.00 nonmembers

The critical system failures that occurred during the manned orbital flights are examined with regard to the pilot's response and effectiveness in coping with hazardous situations. Mercury missions are discussed in relation to the astronaut's responsibilities. Although the Mercury spacecraft was designed for completely automatic or remote control of all normal mission events, a careful analysis clearly indicated the importance of the pilot's role. G.D.B.

N64-23617 Federal Aviation Agency, Oklahoma City, Okla. Civil Aeromedical Research Inst.
STUDIES OF AIR LOADS ON MAN
John J. Swearingen and Ernest B. Mc Fadden May 1963 10 p refs
(CARI-63-9)

Data obtained in three different studies related to measurement of forces on the body due to air movement are summarized. The effects of short duration blast forces on personnel seated or standing at various distances from openings during pressure loss, blast forces necessary to disorient the body from numerous positions, effects of clothing on the drag forces, and measurements of forces and moments on the body during wind-tunnel tests are discussed and compared. Author

N64-23618 Federal Aviation Agency, Oklahoma City, Okla. Civil Aeromedical Research Inst.
THE FLAMMABILITY OF LIP, FACE AND HAIR PREPARATIONS IN THE PRESENCE OF 100% OXYGEN
J. Robert Dille, Charles R. Crane, and George E. Pendergrass Nov. 1963 7 p refs
(CARI-63-27)

The effects of high concentrations and pressures of oxygen and of static sparks upon lip, face, and hair preparations were determined because of questions that frequently arise and apprehension that exists. A wide margin of safety was found for their use at or below one atmosphere of pressure. However, their use in experimental or therapeutic compressions is not deemed safe due to a marked increase in the effects of a static spark upon these compounds at two atmospheres oxygen pressure. Author

N64-23619 Federal Aviation Agency, Oklahoma City, Okla. Civil Aeromedical Research Inst.
SIZE CUES AND THE ADJACENCY PRINCIPLE
Walter C. Gogel Nov. 1963 10 p refs
(CARI-63-28)

The purpose of the present study was to apply the adjacency principle to the perception of relative depth from size cues. In agreement with the adjacency principle, it was found that the size cue between adjacent objects was more effective than the size cue between displaced objects in determining the perceived relative depth position of objects. An additional, although minor, factor concerned with task-set was tentatively identified as contributing to the perception of depth from size cues. Author

N64-23638 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
LIFE ON A SATELLITE
P. Isakov *In its* Stations in Space 10 Feb. 1964 p 12–22 (See N64-23634 16-01)

This is a report of astronautical behavior, intrinsic and imposed, aboard a spacecraft. The author discusses weightlessness, radiation hazard, acceleration, and problems concerned with oxygenation and respiratory processes. Data are drawn for the most part from the information gained from the first three Soviet satellite launchings. A.W.

N64-23639 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
MAN BEFORE LAUNCHING INTO SPACE
Ye. Yugov and A. Serov *In its* Stations in Space 10 Feb. 1964 p 22–28 (See N64-23634 16-01)

The medical and biological problems of space flight are considered, with special emphasis placed upon weightlessness. Data were obtained from the first Soviet space flights. A.W.

N64-23650 Marquardt Corp., Van Nuys, Calif.
SURVEY OF CONTROLLED TETHERING SIMULATION TECHNIQUES
Jun. 1964 14 p
(MP-1266)

With the proposed tethering system, information on position, velocities, and accelerations is obtained at the spacecraft to provide performance information on the worker-machine combination. System qualification on Gemini should demonstrate the utility of controlled tethering systems on future

projects. This survey describes various feasible simulation techniques and explores those techniques that appear most practical. J.R.C.

N64-23655 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
MICROBIOLOGY Selected Articles
14 Nov. 1963 35 p refs Transl. into ENGLISH from Mikrobiologiya (Moscow), v. 32, no. 4, 1963 p 582–597, 727–731 (FTD-TT-63-1016/1+2; AD-425493)

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1. EFFECT OF CONCENTRATIONS OF VARIOUS MEDIUM COMPONENTS ON THE GROWTH AND NITROGEN-FIXATION OF BLUISH-GREEN ALGAE M. S. Takha p 1–12 ref (See N64-23656 16-16)
2. EFFECT OF ILLUMINATION AND TEMPERATURE ON THE FORMATION DUNALIELLA SALINA PIGMENT Ye. S. Mil'ko p 13–23 refs (See N64-23657 16-16)
3. AUTOMATIC TEMPERATURE CONTROL SYSTEMS V. N. Chernov, V. P. Drevush, and I. F. Van'shev p 24–30 (See N64-23658 16-16)

N64-23656 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
EFFECT OF CONCENTRATIONS OF VARIOUS MEDIUM COMPONENTS ON THE GROWTH AND NITROGEN-FIXATION OF BLUISH-GREEN ALGAE
Mokhamed Samekh Takha *In its* Microbiology 4 Nov. 1963 p 1–12 refs (See N64-23655 16-16)

The optimal concentration of Fe, P, K, Ca, Mo, and bicarbonate for growth and nitrogen fixation by three cultures of blue-green algae was determined. A new medium for culturing blue-green algae is suggested. Changes in the pH of the new medium, in growth, and in the nitrogen fixed during the growth, of *Hapalosiphon fontinalis, Anabaena variabilis,* and *Calothrix elenkinii,* is recorded. G.D.B.

N64-23657 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
EFFECT OF ILLUMINATION AND TEMPERATURE ON THE FORMATION OF DUNALIELLA SALINA PIGMENT
Ye. S. Mil'ko *In its* Microbiology 4 Nov. 1963 p 13–23a refs (See N64-23655 16-16)

Increases in luminosity resulted in decreases in the concentration of chlorophyll in *Dunaliella salina* cells. Temperature rises also caused decreases in chlorophyll concentration. Certain optimum conditions are described for proper pigmentation. G.D.B.

N64-23658 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
AUTOMATIC TEMPERATURE CONTROL SYSTEMS
V. N. Chernov, V. P. Drevush, and I. F. Van'shev *In its* Microbiology 14 Nov. 1963 p 24–30 (See N64-23655 16-16)
(FTD-TT-63-1016)

Described is a system assuring automatic temperature control at a given level of the enclosed volume that is intended for the creation of necessary temperature conditions for cultivating microorganisms. The system with intermediate relay assures reliable operation for a long time and can be recommended for application. G.D.B.

N64-23659 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
NEWS OF THE ACADEMY OF SCIENCES OF THE USSR. BIOLOGICAL SERIES Selected Articles
4 Dec. 1963 22 p refs Transl. into ENGLISH from Izv. Akad. Nauk. SSSR, Ser. Biol., no. 5, Sep.–Oct. 1963 p 719–723, 746–754
(FTD-TT-63-1052/1+2; AD-427153)

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1. ROLE OF NUCLEINIC ACIDS AND ALBUMIN IN INDUCED BIOSYNTHESIS OF CHLOROPHYLL Yu. G. Molotkovskiy and V. F. Moryakova p 1–8 refs (See N64-23660 16-16)
2. BIOELECTRIC ACTIVITY OF SKELETAL MUSCULATURE UNDER CONDITIONS OF INTERMITTENT EFFECT OF OVERLOADS AND WEIGHTLESSNESS Ye. M. Yuganov, I. I. Kas'yan, and B. F. Asyamolov p 9–19 refs (See N64-23661 16-16)

N64-23660 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
ROLE OF NUCLEINIC ACIDS AND ALBUMIN IN INDUCED BIOSYNTHESIS OF CHLOROPHYLL
Yu. G. Molotkovskiy and V. F. Moryakova *In its* News of the Academy of Sciences of the USSR, Biological Series, 4 Dec. 1963 p 1–8 refs (See N64-23659 16-16)

The assumption that synthesis of specific RNA is induced in green plants by the effect of light has been tested using inhibiting analysis. The process supposedly leads to the synthesis of chloroplast albumina, with the final formation of chlorophyll. The effects of uracil antimetabolites, of adenine and uracil, and of chloramphenicol on RNA and albumin synthesis were studied by using bean sprouts. The data show that light-induced formation of chloroplasts and, later, chlorophyll can be transformed through nucleic acid and albumin exchange. D.E.R.

N64-23661 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
BIOELECTRIC ACTIVITY OF SKELETAL MUSCULATURE UNDER CONDITIONS OF INTERMITTENT EFFECT OF OVERLOADS AND WEIGHTLESSNESS
Ye. M. Uganov, I. I. Kasyan, and B. F. Asyamolov *In its* News of the Academy of Sciences of the USSR, Biological Series, 4 Dec. 1963 p 9–19 refs (See N64-23659 16-16)

The state of bioelectric activity of animal and human musculature under the intermediate effect of overloads and weightlessness to 2 units and for 25 to 30 seconds has been investigated. It was found that conditions of weightlessness produced a sharp reduction in the bioelectric activity of skeletal musculature, pointing to the possibility of changing muscle tonus. Overloads caused no such change. The dependence of the observed changes on the functions of the vestibular analyzer also was determined. D.E.R.

N64-23694 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
BULLETIN OF EXPERIMENTAL BIOLOGY AND MEDICINE (SELECTED ARTICLES)
13 Nov. 1963 31 p refs Transl. into ENGLISH from Byull. Eksptl. Biol. i Med. (Moscow), v. 6, no. 8, 1963 p 11–13, 28–37, 116–120
(FTD-TT-63-1013/1+2; AD-424606)

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3. PHYSIOLOGICAL REACTIONS OF THE HUMAN ORGANISM EXPOSED TO THE EFFECTS OF MAXIMUM IN TIME AND MAGNITUDE ACCELERATIONS DIRECTED ALONG THE DORSO-THORACIC AXIS A. S. Barer, G. A. Golov, and Ye. I. Sorokina p 13-19 refs (See N64-23697 16-16)

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N64-23695 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

STUDYING HUMAN TASTE SENSITIVITY UNDER PROLONGED OXYGEN RESPIRATION WITH A PERTINENT DIETARY

N. S. Zayko, M. I. Kuznetsov, and N. A. Chelnokova *In its* Bull. of Exptl. Biol. and Med. 13 Nov. 1963 p 1-5 refs (See N64-23694 16-16)

No changes occur in the taste sensitivity of humans placed in a barochamber with an atmospheric pressure corresponding to the altitude of 5,500 m and given to breath a gas mixture with an increased oxygen content for 2.5 to 8 hr; this points to the normal digestive tract function. This method of determining the functional mobility of the taste receptor apparatus may be used to study nutritional problems in prolonged high-altitude flights. Author

N64-23696 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

ON TRACTIONS OF THE ORGANISM DURING PROLONGED ACTION OF CORIOLIS ACCELERATIONS

N. I. Arlashchenko, B. B. Bokhov, V. Ye. Busygin, N. A. Volokhova, Yu. G. Grigoryev et al *In its* Bull. of Exptl. Biol. and Med. 13 Nov. 1963 p 6-12 refs (See N64-23694 16-16)

This report describes investigations of corresponding reactions among people in a slowly rotating chamber to determine the reactions of the organism in response to prolonged effect of Coriolis accelerations. G.D.B.

N64-23697 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

PHYSIOLOGICAL REACTIONS OF THE HUMAN ORGANISM EXPOSED TO THE EFFECTS OF MAXIMUM IN TIME AND MAGNITUDE ACCELERATIONS DIRECTED ALONG THE DORSO-THORACIC AXIS

A. S. Barer, G. A. Golov, and Ye. I. Sorokina *In its* Bull. of Exptl. Biol. and Med. 13 Nov. 1963 p 13-19 refs (See N64-23694 16-16)

An inquiry was made into the chief indices of external respiration in man during the action of accelerations (up to 15 g) directed along the dorsothoracic axis at an angle of 65° to the back of the armchair. A definite regularity was established in the changes of the indices studied with various accelerations. Definite stages were noted in the development of individual reactions; this regularity reflected the essence of the general biological laws concerning body adaptation to new environmental conditions. Author

N64-23698 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

USE OF AUTOMATIC LOGICAL DEVICES (COMPUTERS) FOR MEDICAL CONTROL

R. M. Bayevskiy, Ye. A. Zil'Bertal', V. M. Kruzenshtern, and V. R. Freydel' *In its* Bull. of Exptl. Biol. and Med. 13 Nov. 1963 p 20-28 refs (See N64-23694 16-16)

An automatic logical device for simultaneous control of six physiological parameters in the form of levels of tension or impulses is described. The information is evaluated by automatic determination of one of the three possible conditions: norm, increase, decrease. After comparing the conditions of all the parameters according to a preset algorithm, a coded conclusion is formed. Analyzed is the work program of the automatic logical device for the urgent diagnosis of acute cardiac insufficiency, syncope, and collapse. Author

N64-23700 Federal Aviation Agency, Oklahoma City, Okla. Civil Aeromedical Research Inst.

ACUTE AND CHRONIC EFFECTS OF THE INSECTICIDE ENDRIN ON RENAL FUNCTION AND RENAL HEMODYNAMICS

D. A. Reins, D. D. Holmes, and L. B. Hinshaw Oct. 1963 11 p refs

(CARI-63-26)

Chronic and acute effects of the insecticide endrin on renal function were studied in dogs. Animals were exposed to endrin chronically by intramuscular injection and acutely by intravenous infusion. In acute studies, dogs developed systemic hypertension and increased renal vascular resistance attributable to a sympatho-adrenal action. Basic renal autoregulation was not impaired by endrin but was masked by effects of blood-borne adrenergic agents. Changes in renal function were minimal. In chronic studies, dogs developed progressive systemic hypotension with variable changes in renal function and terminal renal vasodilation in some instances. Pathological findings were minimal and could be related to hemodynamic alterations in the peripheral vasculature. Results from this investigation provide no evidence for renal failure due to chronic insecticide poisoning. Author

N64-23734 Joint Publications Research Service, Washington, D.C.

PROBLEMS OF SPACE BIOLOGY

N. M. Sisakyan and V. I. Yazdovskiy, ed. 29 Jun. 1964 555 p refs Transl. into ENGLISH of the Book "Problemy Kosmicheskoy Biologii vol. III Moscow, 1964 p 3-490

(JPRS-25287; TT-64-31578) OTS: $7.00

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N64-23735 Joint Publications Research Service, Washington, D.C.

THE MAIN SCIENTIFIC TRENDS OF SPACE BIOLOGY IN THE CONQUEST OF SPACE

V. I. Yazdovskiy *In its* Probl. of Space Biol. 29 Jun. 1964 p 3-6 (See N64-23734 16-16) OTS: $7.00

Special attention is paid to the study of a complex influence of space flight factors that could not be imitated completely on earth. In this connection the necessity of gaining wide experience in collecting scientific data in real flights is pointed out. Author

N64-23736 Joint Publications Research Service, Washington, D.C.

PHYSICAL CONDITIONS OF SPACE FLIGHT AND A BIOLOGICAL CHARACTERIZATION OF THEM

Yu. M. Volynkin and P. P. Saksonov *In its* Probl. of Space Biol. 29 Jun. 1964 p 7-20 refs (See N64-23734 16-16) OTS: $7.00

The paper considers physical conditions of space flight and analyzes the data collected concerning biological effects of those conditions. Physical factors affecting living beings (man included) during space flight are divided into three groups: factors characterizing cosmic space as outer medium (vacuum, ionizing radiation, sharp differences in temperature, etc.); factors of rocket flight dynamics (noise, vibration, accelerations, and weightlessness); and factors characteristics of a long-term stay in a spacecraft cabin (artificial atmosphere, limitation of movements, isolation, peculiar food, etc). The biological action in rarefied atmosphere, ionizing radiation, and weightlessness is discussed in detail. Author

N64-23737 Joint Publications Research Service, Washington, D.C.

BIOLOGICAL AND PHYSIOLOGICAL STUDIES IN ROCKET AND SATELLITE FLIGHTS

O. G. Gazenko, V. N. Chernigovskiy, and V. I. Yazdovskiy *In its* Probl. of Space Biol. 29 Jun. 1964 p 21-34 refs (See N64-23734 16-16) OTS: $7.00

Summarized data concerning biomedical experiments carried out by Soviet scientists on board the rockets, artificial earth's satellites, and spaceships are presented. The results of Yu. A. Gagarin and G. S. Titov's flights are fully described. Some preliminary information obtained during a group space flight made by A. G. Nikolayev and P. R. Popovich is considered. Author

N64-23738 Joint Publications Research Service, Washington, D.C.

BASIC PROBLEMS IN THE STUDY OF WEIGHTLESSNESS

V. I. Yazdovskiy, I. I. Kas'yan, and V. I. Kopanev *In its* Probl. of Space Biol. 29 Jun. 1964 p 35-58 refs (See N64-23734 16-16) OTS: $7.00

The authors present summarized experimental and literature data related to the problem of weightlessness. Principal pathways in the investigation of the problem are outlined. The influence of weightlessness upon human and animal organisms is elucidated. Author

N64-23739 Joint Publications Research Service, Washington, D.C.

SOME PRINCIPLES IN THE FORMATION OF AN ARTIFICIAL HABITAT IN SPACE SHIP CABINS

A. M. Genin *In its* Probl. of Space Biol. 29 Jun. 1964 p 59-65 (See N64-23734 16-16) OTS: $7.00

When creating experimental manned spacecraf there should necessarily be made a compromise between the requirements for maximal comfort for the crew and possibilities provided by modern techniques. However, the increase of the duration of space flight does not allow for a reduction of hygienic requirements for the artificial medium, and at the same time it complicates its conditioning. Several criteria for an artificial medium and methods of its attainment during flights of various duration are considered. Author

N64-23740 Joint Publications Research Service, Washington, D.C.

THE BASIC PROBLEMS OF ENGINEERING PSYCHOLOGY OF SPACE FLIGHT

V. G. Denisov, A. P. Kuz'minov, and V. I. Yazdovskiy *In its* Probl. of Space Biol. 29 Jun 1964 p 66-78 refs (See N64-23734 16-16) OTS: $7.00

Three main lines in engineering psychology are determined: (1) study of psychophysiological capacity of man under conditions of space flight; (2) development of requirements for the operation systems, taking into consideration functional characteristics of a human operator; and (3) development of methods to train cosmonauts for operating spacecraft systems. Author

N64-23741 Joint Publications Research Service, Washington, D.C.

PROBLEMS OF THE PHYSIOLOGICAL INTERACTION OF ANALYZERS AS APPLIED TO SPACE FLIGHTS

V. I. Yazdovskiy and M. D. Yemel'yanov *In its* Probl. of Space Biol. 29 Jun. 1964 p 79–87 refs (See N64-23734 16-16) OTS: $7.00

Hypotheses explaining the mechanism of vegetative disorders that may appear in the course of a prolonged space flight are discussed. The idea of physiological interaction between analyzers is presented and is confirmed to a certain degree by experimental data. The importance of the problem of the interaction of analyzers in relation to space flights is stressed, and a long-range program of investigations is suggested. Author

N64-23742 Joint Publications Research Service, Washington, D.C.

PROBLEM OF WASTE UTILIZATION ON LONG-TERM SPACE FLIGHTS

B. L. Gol'dshvend, B. G. Gusarov, A. G. Lobanov, Yu. Ye. Sinyan, A. P. Tereshchenko et al *In its* Probl. of Space Biol. 29 Jun. 1964 p 88–103 refs (See N64-23734 16-16) OTS: $7.00

It has been shown that a necessary part in a life-support system for space crew should be reutilization. Its function is to remove and process all body and other waste materials into substances suitable for direct employment in other parts of the life-support system. Possible ways to develop the system of reutilization on the basis of biological and physicochemical methods are discussed. Advantages and disadvantages of the methods are revealed. Author

N64-23743 Joint Publications Research Service, Washington, D.C.

REGENERATION OF WATER IN THE SPACESHIP CABIN

Yu. Ye. Sinyak and S. V. Chizhov *In its* Probl. of Space Biol. 29 Jun. 1964 p 104–114 refs (See N64-23734 16-16) OTS: $7.00

The development of an effective method of water regeneration that meets the demands in energy, weight, etc. will make it possible to considerably decrease the start weight of a life-support system for a space crew. A catalytic method of water regeneration from water-containing body wastes of animals and humans is proposed. Sanitary and hygienic tests of the water obtained by both catalytic and lyophilic methods have shown that its quality meets conventional requirements for potable water. Author

N64-23744 Joint Publications Research Service, Washington, D.C.

THE BASIC TRENDS IN THE STUDY OF THE BIOLOGICAL EFFECT OF COSMIC RADIATION AND THE SEARCH FOR MEANS OF PROTECTION AGAINST RADIATION

V. V. Antipov, N. N. Dobrov, and P. P. Saksonov *In its* Probl. of Space Biol. 29 Jun. 1964 p 115–128 refs (See N64-23734 16-16) OTS: $7.00

The paper proves that short flights along the orbits situated lower than the earth's radiation belts are not hazardous for man if no solar chromospheric outbursts occur. Nevertheless, during prolonged space flights along the orbits passing through near-earth radiation belts, especially in the period of solar flares that generate protons, cosmic radiation is one of the main obstacles in the way of conquering outer space. In this connection the immediate research tasks are the determination of relative biological activity of individual components of space radiation, the study of specificity of cosmic radiation in the biological action of a whole complex of space flight factors, the development of principles and means of physical and pharmaceutico-chemical protection of man and the entire biocomplex, the development of methods of physical and biological dosimetry, etc. Author

N64-23745 Joint Publications Research Service, Washington, D.C.

THE SETTING OF THE SPACESHIP CABIN

V. V. Zefel'd *In its* Probl. of Space Biol. 29 Jun. 1964 p 129–133 (See N64-23734 16-16) OTS: $7.00

The objects and space in either the cabin or orbital station represent an integral part of the environment of the crew. This part of the medium must contain characteristic elements of the everyday surroundings of their life on earth, which are related to important moments in the psychic life of the crew prior to the flight. This approach makes it possible to stimulate the normalization of the psychic and physical tonus of the cosmonauts through associations and thus to help the organisms resist the injurious action of monotonous flight rhythm and the sharp decrease in stimuli and impressions. Author

N64-23746 Joint Publications Research Service, Washington, D.C.

MEANS AND METHODS OF BIOMEDICAL RESEARCH IN SPACE FLIGHT

I. T. Akulinichev, L. F. Andreyev, R. M. Bayevskiy, A. Ye. Baynov, B. G. Buylov et al *In its* Probl. of Space Biol. 29 Jun. 1964 p 134–151 refs (See N64-23734 16-16) OTS: $7.00

Methods of physiological investigations and the medical radioelectronic instrumentation installed on board the Soviet satellites 2 and 3 and the Vostok spaceships are described. General requirements for onboard medical instrumentation are discussed. Peculiarities in design of sensors and electrodes are reported. Principal electric schemes of all measuring channels are presented. Author

N64-23747 Joint Publications Research Service, Washington, D.C.

SOME METABOLIC INDICES IN COSMONAUTS

T. A. Fedorova, L. T. Tutochkina, M. S. Uspenskaya, M. S. Skurikhina, and Ye. A. Fedorov *In its* Probl. of Space Biol. 29 Jun. 1964 p 152–168 refs (See N64-23734 16-16) OTS: $7.00

During the training period space pilots revealed peculiar changes in the protein composition of blood serum—a small increase in the relative albumin content and decrease in the content of α_2, β-, γ-globulins and mucoids. Urine showed a decrease in excretion of Dische-positive substances, a fall in the enzymic activity of acid deoxyribonuclease, an increase in the amount of adrenal hormones (free 21-oxy-20-ketocorticosteroids) and, in some cases, mucoids. During rest the content of all these substances in blood and urine usually returned to normal. After the flight a total protein content in the blood of cosmonauts increased to the maximal normal level, or exceeded it, and during prolonged space flight the level of serum mucoids increased some what Author

N64-23748 Joint Publications Research Service, Washington, D.C.
REACTIONS OF HUMAN BEINGS TO WEIGHTLESSNESS
L. A. Kitayev-Smyk *In its* Probl. of Space Biol. 29 Jun. 1964 p 169–177 refs (See N64-23734 16-16) OTS: $7.00

Responses of 193 persons were studied under the conditions of short-term weightlessness during flight. The responses that lessen human tolerance to a weightless state are psychic and vegetative. Illusory sensations occurring at the onset of weightlessness may enable the prediction of the character of subsequent disturbances. The adaptation to weightlessness is discussed. Author

N64-23749 Joint Publications Research Service, Washington, D.C.
EXCITABILITY OF THE HUMAN VESTIBULAR ANALYZER UNDER CONDITIONS OF SHORT-TERM WEIGHTLESSNESS
Ye. M. Yuganov and A. I. Gorshkov *In its* Probl. of Space Biol. 29 Jun. 1964 p 178–189 refs (See N64-23734 16-16) OTS: $7.00

During short-term weightlessness a state of excitability of the vestibular analyzer was studied; it was judged by changes in the character and degree of expression of vestibulosensoric and vestibulomotoric responses and was compared to the terrestrial circumstances under the influence of galvanic current, angle, and Coriolis accelerations. A method is proposed for reducing the excitability of the vestibular analyzer when exposed to the action of external stimuli during short-term weightlessness. Author

N64-23750 Joint Publications Research Service, Washington, D.C.
THE VESTIBULAR ANALYZER AND ARTIFICIAL GRAVITY IN ANIMALS
Ye. M. Yuganov and D. V. Afanas'yev *In its* Probl. of Space Biol. 29 Jun. 1964 p 190–197 refs (See N64-23734 16-16) OTS: $7.00

Data show that peculiarities of the function of the vestibular analyzer in weightlessness hamper the development and normalization of motor actions and lead to disturbances in the functional interaction in the system of analyzers. Labyrinthectomyzed animals seem to develop a new system of interaction between the rest analyzers, which is less subject to the removal of the most sensitive part, i.e., otolith apparatus. Author

N64-23751 Joint Publications Research Service, Washington, D.C.
MICROBIOLOGICAL AND CITOLOGICAL STUDIES IN THE CONQUEST OF SPACE
N. N. Zhukov-Verezhnikov, V. i. Yazdovskiy, I. N. Mayskiy, G. P. Tribulev, A. P. Pekhov et al *In its* Probl. of Space Biol. 29 Jun. 1964 p 198–205 refs (See N64-23734 16-16) OTS: $7.00

The results of a study of biological effectiveness of radiation on lysogenic bacteria are presented; the possiblity of using the lysogenic bacteria to select radiation protection measures is considered. The prospects of the development of space microbiology are discussed. Author

N64-23752 Joint Publications Research Service, Washington, D.C.
THE PROBLEM OF THE DEVELOPMENT OF A PHYSICO-CHEMICAL WASTE UTILIZATION COMPONENT FOR LONG-TERM SPACE FLIGHT
B. L. Gol'dshvend, B. G. Gusarov, A. G. Lobanov, Ye. Ye. Sinyak, A. P. Tereshchenko et al *In its* Probl. of Space Biol. 29 Jun. 1964 p 206–210 refs (See N64-23734 16-16) OTS: $7.00

The data of experimental investigations of reutilization of some body wastes by burning them or by employing chromatographic and catalytic methods are presented. Author

N64-23753 Joint Publications Research Service, Washington, D.C.
CHARACTERISTICS OF CERTAIN ARTIFICIAL SUBSTRATES FOR USE IN A CLOSED ECOLOGICAL SYSTEM
Ye. V. Lebedeva *In its* Probl. of Space Biol. 29 Jun. 1964 p 211–216 refs (See N64-23734 16-16) OTS: $7.00

The determination of the main physical constants that are typical of air and water properties of artificial substrates (vermiculite, penoshamote, ceramsite, perlite), as well as experiments with plants, have resulted in the composition of agrophysical characteristics of these substrates. Possibilities of usage of the substrates for higher plants in a closed ecological system have been indicated. Author

N64-23754 Joint Publications Research Service, Washington, D.C.
TOXIC GASEOUS SUBSTANCES GIVEN OFF BY CHLORELLA
M. M. Korotayev, V. V. Kustov, G. I. Meleshko, L. T. Poddubnaya, and Ye. Ya. Shepelev *In its* Probl. of Space Biol. 29 Jun. 1964 p 217–222 refs (See N64-23734 16-16) OTS: $7.00

During *Chlorella* cultivation the air of the system contains carbon monoxide, nitrogen oxides, and hydrocarbons (perhaps methane). The CO concentration ranged from 0.003 to 0.09 mg/1. The content of nitrogen oxides was 0.0006 to 0.012 mg/1 and that of hydrocarbons was 0.0033 to 0.061 mg/1. A possible mechanism for the production of these substances in photosynthesis is discussed. Author

N64-23755 Joint Publications Research Service, Washington, D.C.
GASEOUS ACTIVITY PRODUCTS EXCRETED BY MAN WHEN IN AN AIR-TIGHT CHAMBER
G. M. Gorban , I. I. Kondrat'yeva, and L. T. Poddubnaya *In its* Probl. of Space Biol. 29 Jun. 1964 p 223–230 refs (See N64-23734 16-16) OTS: $7.00

Experimental studies have shown that a human being in the process of his life activity liberates a number of toxic gaseous products into the surrounding medium. After man has stayed in a sealed cabin for 24 hours the following amounts of the substances have been accumulated there: ammonium, 297 mg; Co for nonsmokers, 278 mg, and for smokers, 417 mg; hydrocarbons, 504 mg; aldehydes, 0.6 mg; ketons, 232 mg; mercaptanes and hydrogen sulphides, 5 mg; fatty acids 89 mg. Permanent constituents of the air in the cabin were carbon dioxide, hydrocarbons, aldehydes and ammonium, the first two being thereby found in the gaseous phase only while the others were contained both in the air and in the condensate. The data presented indicate the necessity to develop effective means of purifying air and to work out the grounds of admissible limits for the concentration of toxic substances in a sealed cabin. Author

N64-23756 Joint Publications Research Service, Washington, D.C.
THE PROBLEM OF ARTIFICIAL HIBERNATION IN SPACE BIOLOGY

N. N. Timofeyev, G. D. Glod, and V. S. Oganov *In its* Probl. of Space Biol. 29 Jun. 1964 p 231-240 refs (See N64-23734 16-16) OTS: $7.00

A comparative estimation of a number of methods of artificial hypothermy is presented in experiments on rats and dogs. A procedure of maintaining rats at − 18° to − 16° and dogs at − 25° to − 23° C in the state of deep hypothermy up to 24 hrs was elaborated, natural respiration and blood circulation being thereby retained. In experiments with rats a state of superdeep hypothermy was achieved employing the method of cooling under the conditions of hypoxy-hypercapnia. While in this state the animals underwent the action of accelerations incompatible with life (up to 74 units for 3 to 5 minutes), and main living functions of the organisms were then restored. The authors believe that the employment of artificial hibernation in space studies is quite possible, and they consider some ways of its practical application. Author

N64-23757 Joint Publications Research Service, Washington, D.C.

THE PROBLEM OF INVESTIGATION OF THE COSMONAUT'S PHYSICAL EFFICIENCY EXPERIMENTALLY AS APPLIED TO SPACE FLIGHT PROBLEMS

L. I. Kakurin, Yu. N. Tokarev *In its* Probl. of Space Biol. 29 Jun. 1964 p 241-250 refs (See N64-23734 16-16) OTS: $7.00

Man-in-space flights have proved that man is able not only to tolerate the action to extremal factors satisfactorily for a long time, but also is able to perform various tasks. The necessity to study the professional and research activity of the space crew has caused further integration of space physiology. The new science, the physiology of labor of space pilots, elucidates the capability of performing certain work at every stage of the flight and gives physiological grounds to the means for maintaining effective performance of the crew. By means of a simulating device whose conditions are maximally close to those of space flight, it seems possible to find out whether the stresses of a flight task are in agreement with the physical capacities of man and to establish the optimal regime of work and rest. Author

N64-23758 Joint Publications Research Service, Washington, D.C.

STUDY OF THE MOTOR REACTION TIME IN MAN BY THE MULTIPLE EFFECTOR METHOD UNDER ISOLATION CONDITIONS

V. I. Myasnikov *In its* Probl. of Space Biol. 29 Jun. 1964 p 251-264 refs (See N64-23734 16-16) OTS: $7.00

The physiological record of many indices during registration of a motor response under isolation conditions made it possible to separate the orienting reflex and to evaluate its role in the general response of the organism to the stimulus applied. The role of the orienting reflex changed according to the conditions of the experiment and functional state of the organism under test. In experiments with a regular diurnal cycle, the reduction of a latent period of the response was due to the degree to which the subjects were trained for this kind of reaction. In experiments with a shifted diurnal cycle but conducted in rarefied atmospheric pressure that corresponded to the height of 5,000 m, the orienting reflex represented the factor mobilizing the organism to respond to the action of its environment. This was reflected in a relative stability of indices of a latent period of a responsive motor reaction. Author

N64-23759 Joint Publications Research Service, Washington, D.C.

THE MAINTENANCE OF HABITS OF TRANSMITTING INFORMATION UNDER LONG-TERM ISOLATION CONDITIONS

A. P. Kuz'minov, V. F. Onishchenko, and M. M. Sil'vestrov *In its* Probl. of Space Biol. 29 Jun. 1964 p 265-270 refs (See N64-23734 16-16) OTS: $7.00

The influence of prolonged isolation on man's performance and on habit stability is discussed. The data of five experiments on prolonged confinement have been analyzed. In the first days the indices of the habit decrease qualitatively and quantitatively. During the second and third days of isolation the disturbed habit and performing ability are restored but not entirely. The average errors for a well-trained operator are higher when he is working in isolation than when under normal circumstances. The character of emotional strain depends on the individual peculiarities of each subject studied. Author

N64-23760 Joint Publications Research Service, Washington, D.C.

THE EFFECT OF STATOKINETIC STIMULI ON CERTAIN BODY FUNCTIONS

G. V. Altukhov and V. I. Kopanev *In its* Probl. of Space Biol. 29 Jun. 1964 p271-291 refs (See N64-23734 16-16) OTS: $7.00

The effects of certain statokinetic stimuli on human beings, i.e., of quick head movements, slow rotations, and Coriolis accelerations, have been studied. Electrocardiogram, electroencephalogram, skin-galvanic reaction, blood pressure, and respiration rate were used as indices of the functional state. Subjective reports of those tested were also taken into account. The investigations carried out proved that upon the action of statokinetic stimuli the pulse rate and blood pressure increased, as a rule, while the intervals shortened and the amplitude of T and R spikes in ECG decreased. The cortical bioelectrical activity changed in a different manner (activation, or depression, or invariability were occasionally noted), which was to a certain degree due to statokinetic stability of the subjects. Author

N64-23761 Joint Publications Research Service, Washington, D.C.

COMBINED EFFECT OF VIBRATION AND IONIZING RADIATION ON THE VESTIBULAR AND MOTOR-DEFENSE REFLEXES

Z. I. Apanasenko and M. A. Kuznetsova *In its* Probl. of Space Biol. 29 Jun. 1964 p 292-302 refs (See N64-23734 16-16) OTS: $7.00

The effects of vibration on the radiation reaction on guinea pigs and black mice have been studied from the aspect of survival, function of the vestibular analyzer, and latent period of flexor reflex. Author

N64-23762 Joint Publications Research Service, Washington, D.C.

AUTONOMIC NERVOUS SYSTEM REACTIONS FROM STIMULATION OF THE VESTIBULAR ANALYZER AND THEIR POSSIBLE ROLE IN COMPLICATING SPACE FLIGHT CONDITIONS

A. V. Lebedinskiy, Yu. G. Grigor'yev, R. M. Lyubimova-Gerasimova, and B. I. Polyakov *In its* Probl. of Space Biol. 29 Jun. 1964 p 303-314 refs (See N64-23734 16-16) OTS: $7.00

Employing the method of gradual stimulation of semicircular canals, the role of the time factor in the action of a stimulus upon the manifestation of vestibulovegetative reflexes has been shown. A correlation between the value of an adequate stimulus and the character of these reflexes has

been established. A hypothesis of biological expediency of some responses to the stimulation of the vestibular analyzer has been put forth, and mechanisms of their development are considered. Author

N64-23763 Joint Publications Research Service, Washington, D.C.
THE INFLUENCE OF GRAVITY EFFECTS FROM LANDING ON ANIMALS IMMERSED IN WATER
G. P. Mirolyubov *In its* Probl. of Space Biol. 29 Jun. 1964 p 315-323 refs (See N64-23734 16-16) OTS: $7.00

The enhancement of organism tolerance to the action of impact stresses has now become an urgent problem in space flights. The method of liquid immersion makes it possible to raise appreciably the tolerance limits of overloads occurring at the landing. The effect of hydraulic pressure at the moment of impact overloads can bring about changes in the functions of cardiovascular and respiratory systems and some disturbances in the organism that can be observed upon the action of an impact pressure wave. The protection of an organism against hydraulic pressure occurring at the impact moment makes it possible to withstand overloads up to 1,000 units quite satisfactorily. Author

N64-23764 Joint Publications Research Service, Washington, D.C.
THE EFFECT OF G-FORCES ACTING ONCE ON THE STRUCTURE OF THE INTERNAL ORGANS OF EXPERIMENTAL ANIMALS
V. G. Yeliseyev, Yu. N. Kopayev, and Ye. F. Kotovskiy *In its* Probl. of Space Biol. 29 Jun. 1964 p 324-333 refs (See N64-23734 16-16) OTS: $7.00

Overloads of 8 and 12 g acting in the ventrodorsal direction for 3 and 1 minute, respectively, bring about similar changes in internal organs of dogs. The changes are related to the vascular channel and to parenchymal elements. Most serious changes develop in organs of great mass and in the fine vascular system, i.e., lungs, liver, kidneys. The degree of change increases along the direction of stress action. Disturbances in the organs depend to a greater degree upon the duration of the stress action and to a lesser degree upon its value when overloads range within the limits mentioned (8 and 12 g). The changes observed are of reversible character. Their compensation takes place on the 30th to 60th day of the experiment. Author

N64-23765 Joint Publications Research Service, Washington, D.C.
STUDY OF THE BIOELECTRICAL ACTIVITY OF CERTAIN CEREBRAL CENTERS DURING GRAVITY EFFECTS
A. N. Razumeyev and P. M. Suvorov *In its* Probl. of Space Biol. 29 Jun. 1964 p 334-347 refs (See N64-23734 16-16) OTS: $7.00

Upon the action of transverse overloads, 17 subjects showed distinct changes in EEG of the brain cortex that were pressed in the synchronization of bioelectrical activity and were of phase character. The changes depended on the value and duration of the overload and of individual peculiarities of the subject under test. At the beginning, EEG showed quick β-waves; then α-rhythm began to prevail and was followed by Δ-waves. Author

N64-23766 Joint Publications Research Service, Washington, D.C.
THE EFFECT OF LONG-LASTING TRANSVERSE G-FORCES ON THE FUNCTIONAL CONDITION OF THE CENTRAL NERVOUS SYSTEM OF ANIMALS
V. Ye. Belay, P. V. Vasil'yev, and S. P. Kolchin *In its* Probl. of Space Biol. 29 Jun. 1964 p 348-355 refs (See N64-23734 16-16) OTS: $7.00

In experiments on white rats and mice the influence of transverse accelerations upon the functional interaction of excitatory and inhibitory processes in the brain cortex and subcortex was studied. The interactions were estimated on the basis of the animal responses to two kind of drugs: chloralhydrate and sodium thiopenthal. Upon long-term action of transverse accelerations, a change in the functional state of higher parts of the central nervous system is observed. The character of the change depends on the value and duration of the overload action. During short-term action (for 3 minutes) of overloads, excitation of brain cortex and inhibition of subcortex were noticed, whereas during extended action it proceeds in the other direction i.e., inhibition of cortex and excitation of subcortex. Author

N64-23767 Joint Publications Research Service, Washington, D.C.
THE SIGNIFICANCE OF PHYSIOLOGICAL STUDIES OF THE SPEECH PROCESS FOR PURPOSES OF CONSTRUCTING AUTOMATIC SPEECH RECOGNITION SYSTEMS
V. A. Kozhevnikov and L. A. Chistovich *In its* Probl. of Space Biol. 29 Jun. 1964 p 356-368 refs (See N64-23734 16-16) OTS: $7.00

Automatic distinction and synthesis of speech should be developed through a close physiological study of the main principles underlying the process of speech of man. The procedure of a continuous electrical registration of a number of indices characteristic of the articulation apparatus has been described. The procedure permits the study of the dynamics of articulation movements in speech and accumulates a statistically significant amount of relevant information. Author

N64-23768 Joint Publications Research Service, Washington, D.C.
CHARACTERISTICS OF A SUSPENSION OF ALGAE AS AN OPTICAL SYSTEM
S. V. Tageyeva, A. B. Brandt, V. S. Korshunova, and I. P. Generozova *In its* Probl. of Space Biol. 29 Jun. 1964 p 369-390 refs (See N64-23734 16-16) OTS: $7.00

With the aid of a universal device for the investigation of plant optical properties those of the suspension of Chlorella pyrenoidosa P-82 and Chlorella sp. K strains were studied. Light absorption by the Chlorella suspension of one strain proceeds in agreement with the Bouguer-Lambert-Beer law, the absorption value being in the main determined by the concentration of pigments (chlorophyll) in the volume studied. Nevertheless, the absolute value for various strains of Chlorella strongly depends upon the cell dimensions and microscopic structures. Optical parameters of algal strains applied can provide information on the nature of their photosynthetic apparatus and be used for calculations of special device to obtain cultures of unicellular alga of high productivity. Author

N64-23769 Joint Publications Research Service, Washington, D.C.
CHANGE IN THE SENSITIVITY AND REACTIVITY OF THE VESTIBULAR ANALYZER UNDER THE INFLUENCE OF IONIZING RADIATION
A. A. Sveshnikov and A. V. Sevan'kayev *In its* Probl. of Space Biol 29 Jun. 1964 p 391-403 refs (See N64-23734 16-16) OTS: $7.00

Taking into account the urgency of the problem of ionizing radiation effect on the function of the vestibular analyzer, a study to determine a dose to bring about first functional

changes was undertaken. The changes in the vestibular analyzer upon γ-irradiation of rabbits and dogs of 50 to 5,000 r were observed. A group of dogs was irradiated with protons of 500 to 350 rad (proton energy 510 Mev). The threshold sensitivity and reactivity were determined by means of a rotating device, and cupulograms, termed vestibulograms, were plotted. First changes in the function of labyrinth have been found to take place at the dose of 50 and 100 r. The dose of 200 r can be considered as a threshold because a regular decrease in the labyrinth excitability is observed; higher doses lead to a considerable inhibition of the function of the vestibular apparatus. The doses of 100 and 50 r can be expected to display an opposite effect, i.e. augmented excitability of the analyzer. The data are presented, concerning a conjugated increase in excitability as a result of a cumulative action of irradiation, vibration, reduced atmospheric pressure, and noise upon a living organism. Author

N64-23770 Joint Publications Research Service, Washington, D.C.

REACTIONS OF THE VASCULAR SYSTEM OF THE CRANIAL CAVITY DURING EQUIVALENT LONGITUDINAL G-LOADS OF ± g

Yu. Ye. Moskalenko, O. V. Graunov, O. G. Gazenko, and N. I. Kas'yan *In its* Probl. of Space Biol. 29 Jun. 1964 p 404-415 refs (See N64-23734 16-16) OTS: $7.00

In experiments on rats, rabbits, and cats the electroplethysmography technique has been applied to study changes in blood filling of intracranial cavity upon equivalent longitudinal gravitation loads ± g appearing when the animal is in vertical position. While comparing the curves obtained with calculations made on simulation models, active responses of the brain vascular system have been revealed that occur 4 to 8 seconds after the body posture has changed and are meant to normalize the bloodfilling of the intracranial cavity. In some cases electroplethysmography indicated disturbances in the activity of the central nervous system. Some special experiments have shown that active reactions are specific for cerebral vessels, and they appear upon equivalent longitudinal gravitation loads of 0.3 ±0.4 g. Author

N64-23771 Joint Publications Research Service, Washington, D.C.

THE APPLICATION OF MATHEMATICAL METHODS TO SPACE MEDICINE

R. M. Bayevskiy, V. V. Bogdanov, A. D. Voskresenskiy, A. D. Yegorov, and N. A. Chekhonadskiy *In its* Probl. of Space Biol. 29 Jun. 1964 p 419-430 refs (See N64-23734 16-16) OTS: $7.00

Effective employment of telemetric channels is connected with the application of the theory of information and with the calculation of elements in onboard computers. The opportunity is given for obtaining additional information by calculating the correlative function. Some examples of algorithms for automatic information processing are given. Biological implications of certain mathematical indices decoding medical information are presented. The application of simulation models is considered. Author

N64-23772 Joint Publications Research Service, Washington, D.C.

SOME PROBLEMS OF APPLICATION OF THE THEORY OF RANDOM FUNCTIONS TO SPACE BIOLOGY AND MEDICINE

A. D. Yegorov and N. A. Chekhonadskiy *In its* Probl. of Space Biol. 29 Jun. 1964 p 431-437 refs (See N64-23734 16-16) OTS: $7.00

It has been ascertained that the main physiological functions of an animal (dog) and man represent mathematically random functions of time or external effects upon the organism. The question of mathematical processing of the results of physiological investigations employing methods developed by the theory of random functions is considered. Physiological interpretation of statistical characteristics of random functions is presented. Author

N64-23773 Joint Publications Research Service, Washington, D.C.

METHODS OF OBTAINING OXYGEN BY ELECTROLYTIC DECOMPOSITION OF WATER UNDER CONDITIONS OF WEIGHTLESSNESS

B. G. Grishayenkov, L. L. Zablotskiy, O. F. Ostapenko, Yu. M. Semenov, and A. G. Fomin *In its* Probl. of Space Biol. 29 Jun. 1964 p 438-442 refs (See N64-23734 16-16) OTS: $7.00

To perform electrolysis under conditions of weightlessness, it is necessary to provide the removal of the gases formed (oxygen and hydrogen) and a continuous contact of electrodes with the main mass of electrolyte. This can be done either with the aid of an artificial field of force by means of rotation of the device as a whole (or some parts of it), or at the expense of the physical and chemical properties of substances composing electrodes and diaphragms. Author

N64-23774 Joint Publications Research Service, Washington, D.C.

THE POSSIBILITY OF PHYSICOCHEMICAL SYNTHESIS OF CARBOHYDRATES IN A SPACESHIP CABIN

Yu. Ye. Sinyan *In its* Probl. of Space Biol. 29 Jun. 1964 p 443-453 refs (See N64-23734 16-16) OTS: $7.00

Under the conditions of a prolonged space flight, carbon dioxide, hydrogen, and water are initial products for the synthesis of carbohydrates. Experiments on the reaction with the use of a smouldering discharge and ultraviolet reaction were unsuccessful. The way to synthesize carbohydrates is the employment of the reaction of formaldehyde polymerization discovered by Butlerov. One possible scheme of carbohydrate synthesis under space flight circumstances involves hydration of CO_2 to methane, oxidation of methane to formaldehyde, with subsequent polymerization to monosaccharides. Formaldehyde can be obtained via methanol formation. Author

N64-23775 Joint Publications Research Service, Washington, D.C.

THE PROBLEM OF INCREASE IN THE PHOTOSYNTHETIC PRODUCTIVITY OF A CHLORELLA CULTURE IN APPARATUSES FOR BIOLOGICAL REGENERATION OF AIR

G. I. Meleshko *In its* Probl. of Space Biol 29 Jun. 1964 p 454-458 refs (See N64-23734 16-16) OTS: $7.00

The productivity of *Chlorella* cultures in great densities has been investigated. It has been shown that it is possible to obtain about 246 e oxygen per e suspension per day at the expense of a considerable increase of the culture density, the cultivation conditions being retained for each cell. Author

N64-23776 Joint Publications Research Services, Washington, D.C.

ANALYSIS OF TWO METHODS FOR MEASURING THE RATE OF PHOTOSYNTHESIS OF CHLORELLA

Ye. A. Ivanov and I. V. Aleksandrov *In its* Probl. of Space Biol. 29 Jun. 1964 p 459-475 refs (See N64-23734 16-16) OTS: $7.00

While studying the dynamic properties of *Chlorella* culture, the capillary manometric and the polarographic methods to measure the photosynthesis intensity of this culture have

been investigated. It has been established that, upon certain parameters and techniques, an apparatus of high precision and insignificant delay can be designed. The polarographic method is more adequate for the development of a photosynthesis indicator in the systems of automatic operation than biological regeneration of the air. Author

N64-23777 Joint Publications Research Service, Washington, D.C.
REPEATED USE OF NUTRIENT MEDIA FOR THE CULTIVATION OF CHLORELLA PYRENOIDOSA
T. B. Galinina *In its* Probl. of Space Biol. 29 Jun. 1964 p 476–480 refs (See N64-23734 16-16) OTS: $7.00

The influence of a repeated use of cultural liquids on *Chlorella* growth has been investigated. Their stimulatory and inhibitory action is related to an absolute increase in the amount of cells per volume of medium unit during the period of preliminary cultivation. When growing a cultural liquid utilized for the second time its effect of stimulation or inhibition decreases. Author

N64-23778 Joint Publications Research Service, Washington, D.C.
MATHEMATICAL ANALYSIS OF THE PROCESS OF MASS CULTIVATION OF CHLORELLA IN BIOLOGICAL CULTIVATORS WITH IRREGULAR SHAPES
I. V. Smirnov *In its* Probl. of Space Biol. 29 Jun. 1964 p 481–502 ref (See N64-23734 16-16) OTS: $7.00

Productivity of biological cultivators of asymmetric profile is estimated quantitatively. The relation of the irradiated surface to the suspension volume required to provide an adequate gas-exchange for a given rayflux intensity is presented. The values of coefficients characterizing a biological cultivator as a gas-exchanger are given. Author

N64-23779 Joint Publications Research Service, Washington, D.C.
THE PROBLEM OF AUTOMATIC CONTROL OF ALGAL CULTIVATION CONDITIONS
Ye. A. Ivanov and I. V. Aleksandrov *In its* Probl. of Space Biol. 29 Jun. 1964 p 503–516 refs (See N64-23734 16-16) OTS: $7.00

An analytical study of a kind of extremal operation over Chlorella utilized as a green plant in the system of biological air regeneration is presented. It has resulted in well-grounded suggestions concerning biological and engineering investigations of the culture required for its automatic operation. Author

N64-23780 Joint Publications Research Service, Washington, D.C.
THE PROBLEM OF BURNING ACTIVITY WASTE OF ORGANISMS (GAS FRONT REACTIONS, THE CONDITIONS OF THEIR EXISTENCE AND PROPAGATION)
S. N. Shorin and V. M. Dapshis *In its* Probl. of Space Biol. 29 Jun. 1964 p 517–533 refs (See N64-23734 16-16) OTS: $7.00

The paper describes some peculiarities typical of front gas reactions in combustible gas mixtures that take place in limited or unlimited space, regardless of the effects of gravitational fields. A formula is given to determine the lowest limit of reactivity; by means of mathematical analysis an equation to estimate the distribution rate of the reaction front is obtained. Calculations by formulas are compared to various experimental data. Author

N64-23781 Joint Publications Research Service, Washington, D.C.
AUTOMATION OF CULTIVATION OF UNICELLULAR ORGANISMS FOR UTILIZATION IN A CLOSED BIOLOGICAL SYSTEM
I. N. Gitel'zon, N. A. Terskov, V. A. Batov, O. G. Baklanov, and B. G. Kovrov *In its* Probl. of Space Biol. 29 Jun. 1964 p 534–539 (See N64-23734 16-16) OTS: $7.00

A simulation model was used to try automatic operation in many parameters over biosynthesis of unicellular organisms. An emphasis is placed on those studies of transition processes in the culture growth as the parameters of the external medium change. Author

N64-23782 Joint Publications Research Service, Washington, D.C.
AUTOMATED APPARATUS FOR STUDYING THE RELATIONSHIP BETWEEN THE PHOTOSYNTHESIS OF HIGHER PLANTS AND MINERAL NUTRITION
V. G. Chuchkin and V. I. Rozhdestvenskiy *In its* Probl. of Space Biol. 29 Jun. 1964 p 540–551 refs (See N64-23734 16-16) OTS: $7.00

The concentration of elements in the nutritive solution can be regulated according to any given program by means of panels of industrial automatic devices. Photosynthesis is measured by infrared gas analyzer. Author

N64-23865 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
MEASUREMENT OF THE TOTAL RADIATION DOSE ON VOSTOK 5 AND 6
I. A. Savenko, N. F. Pisarenko, P. I. Shavrin, and V. Ye. Nesterov *In its* Cosmic Res. 27 Apr. 1964 p 236–239 refs (See N64-23852 16-29)

This article describes the results obtained from the data of the dosimetric apparatus on Vostok V and VI. The total radiation doses received by cosmonauts V. F. Bykovsky and V. V. Tereshkova are submitted. Author

N64-23867 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
FLUCTUATIONS IN THE ELECTROENCEPHALOGRAM OF A MAN
V. I. Myasnikov *In its* Cosmic Res. 27 Apr. 1964 p 248–259 refs (See N64-23852 16-24)

This article cites the dynamics of the basic EEG indices (alpha-rhythm frequencies) and amplitudes and also the response when a light stimulus is cut off during extended isolation under different regimes of daily activity. In the tests with a normal regime, the alpha-rhythm amplitude of the initial EEG curve dropped without changing its frequency, while in those with a shifted regime the decrease of the alpha-rhythm amplitude was accompanied by the appearance of diffuse slow waves and alpha-rhythm exaltation as a result of the stimulus. These fluctuations of biological activity give grounds for hypothesizing the development of inhibitory processes in the central nervous system of the subjects. Author

N64-23896 Army Medical Research and Nutrition Lab., Denver, Colo.
THE EXCRETION OF LIPID AND LIPID SUBSTANCES IN HUMAN SWEAT
C. Frank Consolazio, Le Roy O. Matoush, Richard A. Nelson, and Gilbert A. Leveille 13 Nov. 1963 9 p refs
(Rept.-280; AD-433521)

Under the conditions of this study at high environmental temperatures, the total excretion of lipid substances in sweat was low and would not seem to be of consequence in studies of lipid metabolism. During a 7 1/2-hour exposure period at high temperatures, the total lipid excretion in sweat ranged between 25 and 46 mg. As one would expect, since the total lipid excretion in sweat was low, the excretion of cholesterol, free and total, and lipid phosphorus were also low. Author

N64-23899 Grumman Aircraft Engineering Corp., Bethpage, N.Y.
A METHOD FOR THE PRODUCTION OF CONTROLLED MICROBIOLOGICAL CORROSION ON TEST SPECIMENS
Edward A. Calvelli 1 Oct. 1963 11 p refs
(ADN-09-08a-63.1)

An accelerated biological method was developed to produce corrosion on various test alloys. This method will provide corroded specimens almost as rapidly as any artificial means, and being biologically induced, it will produce more natural configurations. Two organisms are used to produce the desired corrosion; Thiobacillus thioparus and Thiobacillus thiooxidans. These organisms are strict autotrophs (able to grow in the absence of organic matter) and therefore make the media easier to prepare and maintain. They were selected for their ability to produce sulfuric acid as a waste product and to tolerate a considerable amount of it in the media employed. Sterility is not required, and safety problems are minimized. Author

N64-23993 Space Technology Labs., Inc., Redondo Beach, Calif.
STUDY OF MODEL MATCHING TECHNIQUES FOR THE DETERMINATION OF PARAMETERS IN HUMAN PILOT MODELS. REPORT ON TASK 2, LINEAR, TIME-VARIANT MODELS
G. A. Bekey, R. E. Rose, and H. F. Meissinger 20 Nov. 1963 62 p refs
(Contract NAS1-2582)
(NASA-CR-56374; Rept.-8426-6003-RU-000) OTS: $6.60 ph

The initial phase of the study is aimed at an improvement of convergence time of the continuous model matching technique developed previously. The dependence of convergence time on the choice and composition of the criterion function, on parameter adjustment gain, and on filtering in the adjustment loop is studied. Results obtained in this phase are used in matching artificially perturbed parameters of a second-order system by adjusting the parameters of a second-order model. The original system is made time variant by perturbing its parameters sinusoidally or stepwise. The model matching technique is applied to the determination of parameters in a mathematical model of a human pilot engaged in performing a time-varying control task. Author

N64-24007 Argentina Comision Nacional De Energia Atomica, Buenos Aires
LOCALISATION OF THE PLACENTA BY MEANS OF RADIOACTIVE ISOTOPES [LOCALIZACION DE LA PLACENTA POR MEDIO DE LOS ISOTOPOS RADIOACTIVOS]
Leon Fisch, Hernan Garcia Del Rio, and Victorio Pecorini 1963 12 p refs In SPANISH *Its* Informe No. 97

A new clinical method for determining the site of the insertion of the female placenta has been tested clinically. Using 1 1/2 grains of radioactive potassium, X-ray analysis, and albumin counts, the method is 90% effective. However, the clinical evidence is still insufficient for general adaptation of the method. D.E.R.

N64-24008 Maryland U., College Park
BUFFERING ACTIVITY OF ALGAL CELLS AND ITS EFFECT ON CELL DIVISION
Constantine Sorokin New York and London, Academic Press [1964] 9 p refs Repr. from Exptl. Cell Research no. 33, 1964 p 508-515
(Grant NsG-70-60)

Buffering capacity of cells was evaluated in terms of its effects on changes in pH of the suspending fluid and on cell division. Synchronized 7-hour cells of the green, high-temperature alga, *Chlorella* 7-11-05, were centrifuged out of a complete nutrient medium, resuspended in different concentrations of sulfuric acid, and supplied in darkness with atmospheric air. It was observed that the effect of buffering activity of cells on pH of the surrounding medium was a gradual, time-dependent phenomenon. Changes in pH and the degree of the completion of cell division depended on the initial acidity of the medium and on the amount of cells per volume of suspension. With the increase in acidity, the amount of cells required to buffer it increased disproportionally faster. Thus, within certain range of acid concentrations, a doubling in acidity required 2.2 times increase in the amount of cells necessary to buffer the new level of acidity. Factors affecting buffering activity of cells were discussed. Author

N64-24012 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
THE STATE OF WEIGHTLESSNESS AND ARTIFICIAL GRAVITY
I. I. Kas'yan and V. I. Kopanev 20 Mar. 1964 26 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. No. 6, 1963 p 880-891
(FTD-TT-64-140/1+4; AD-435526)

Space medicine is currently confronted with important problems relating to the prevention of undesirable influences on animals and man due to weightlessness. The greatest prospects lie in the creation of artificial gravity, so that persons can be provided with earth-like conditions aboard the spacecraft during extended flights. G.D.B.

N64-24040 Space Technology Labs., Inc., Redondo Beach, Calif.
A STUDY OF MODEL MATCHING TECHNIQUES FOR THE DETERMINATION OF PARAMETERS IN HUMAN PILOT MODELS
G. A. Bekey, H. F. Meissinger, and R. E. Rose 2 May 1964 170 p refs
(Contract NAS1-2582)
(NASA-CR-56362; Rept.-8426-6006-RU000) OTS: $12.00 ph

This report presents the results of a study of techniques for the determination of parameters in mathematical models of the human pilot. The study departs from conventional approaches because the pilot is characterized by transfer functions or quasi-linear describing functions, progressing into the domain of time-variant and nonlinear operations and representative models of this type. The final portion of the study is concerned with manual tracking in two axes—the operator is modeled as a multiple input-multiple output system. Emphasis was placed primarily on development of computational methods; model matching experiments on synthetic pilots with known parameters were required. The resulting methodology was successfully applied to actual pilot tracking data and provided new insight into the pilot's dynamic response. The experimental results are presented in the report. A part of the study was devoted to the comparison of continuous and iterative parameter adjustment methods. In addition, significant analytical results were derived pertaining to

the nature of parameter optimization by the gradient method. The report concludes with a recommendation of areas for further study of mathematical pilot models. Author

N64-24064 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
PROBLEM OF ELECTRONARCOSIS AND ELECTRO-SLEEP
Z. Servit and Ya. Burets, et al 13 Feb. 1964 21 p refs Transl. into ENGLISH from Chekhoslovatskaya Fiziol. (USSR) v. 2, no. 4 1953 p 337–346
(FTD-TT-63-931/1+2; AD-435500)

Continuous galvanic current can produce electronarcosis (galvanonarcosis) only among lower vertebrates. Among higher vertebrates (mammals), continuous galvanic current produces a narcotizing effect only in combination with a proper pharmacological narcotic. Author

N64-24070 Federation of American Societies for Experimental Biology, Washington, D.C. Life Sciences Research Office
A STUDY OF THE RATIONALE AND TECHNIQUES FOR LONG-RANGE TECHNOLOGICAL FORECASTING IN THE BIOLOGICAL AND MEDICAL SCIENCES
15 Mar. 1964 52 p refs
(Contract DA-49-092-ARO-9)
(AD-436723)

Forecasts are potential aids in the planning of future technological environments. Their usefulness depends on their validity. Accurate deductions are essential regarding anticipated responsiveness to existing and expected opportunities for achievements in selected areas of science and technology. This is a review of the multiple forces that determine the reliability of such deductions or predictions. Author

N64-24092 Harry Diamond Labs., Washington, D.C.
PROTECTION OF THE HUMAN EYE FROM LASER RADIATION
Harold W. Straub 10 Jul. 1963 11 p refs
(TR-1153; AD-436705)

Various possibilities for protecting the human eye from blinding through laser radiation were considered. Of the investigated selectively absorptive and/or selectively reflective (dielectric) optical filters, some have to be disregarded for a variety of reasons. The Schott BG-18 type filter glass, in a thickness of approximately 4.3 mm, appears to provide adequate protection in the low and medium energy pulse range and in a spectral range between 0.69 and 1.2μ, covering the ruby as well as the Nd-doped glass and Ca WO_4 lasers. The calculations are based on the assumption of equality of the burn sensitivities of the human and of the rabbit retina. Author

N64-24100 Library of Congress, Washington, D.C. Aerospace Information Div.
SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS. PART A: BIOSCIENCES Compilation of Abstracts
6 May 1964 19 p refs
(AID-P-64-33; AD-600129) OTS: $1.60 ph

This is a compilation of abstracts on space medicine and biology, space physiology, and perceptual physiology. E.C.

N64-24110 Chicago U., Ill. Enrico Fermi Inst. for Nuclear Studies
NEW APPROACHES IN CORRELATIVE STUDIES OF BIOLOGICAL ULTRASTRUCTURE BY HIGH-RESOLUTION ELECTRON MICROSCOPY
H. Fernandez Moran [1963] 34 p refs Presented at the Roy. Microscop. Society's Celebration of the "Tercentenary of the Microscope in Living Biology", Bethesda, Md., 9 Apr. 1963 Submitted for Publication
(Grants NsG-441-63; NIH-B-2460; NIH-C-3174; NIH-NB-04267; Contract AT(30-1)-2278)
(NASA-CR-56227) OTS: $3.60 ph

In this brief review, representative examples have been selected to illustrate characteristic features of new methodological approaches in correlative studies of native biological systems. The topics covered are as follows: (1) fine structure of the nerve myelin sheath; (2) electron microscope and X-ray diffraction studies of crystalline insect virus inclusions; (3) correlation of ultrastructure and function in mitochondrial membrane; (4) electron microscopy of negatively stained solubilized lipids; (5) correlated electron microscopic and biochemical studies of the *E. coli* pyruvate dehydrogenation complex; (6) the study of biological systems at liquid-helium temperatures; and (7) general design concepts of a cryoelectron microscope using superconducting electromagnetic lenses. R.T.K.

N64-24116 Allied Research Associates, Inc., Concord, Mass.
BIBLIOGRAPHY ON BIOSENSORS. A SAMPLING OF THE WORLD LITERATURE 1900–1963
J. Healer Dec. 1963 340 p refs 3rd Ed.
(Contract NASw-535)
(NASA-CR-56347; ARA-T-9211-5 Vol. II) OTS: $19.75 ph

This bibliography was compiled during a program for assembly, evaluation, analysis, and application of biosensing devices. It was placed in an IBM-card code system, and the cards are available. A.W

N64-24119 Columbia U., New York, N.Y. Legislative Drafting Research Fund
SOME MAJOR HAZARDS IN GOVERNMENT SPONSORED ACTIVITIES
Menelaos D. Hassialis, Robert I. Bernstein, and Lawrence H. O'Neill Jan. 1964 143 p refs
(Contract NASr-181)
(NASA-CR-56623) OTS: $11.00 ph

This report contains nine chapters as follows: (1) Summary; (2) Introduction; (3) Space Vehicle Systems; (4) Missiles; (5) Nuclear Engines and Weapons; (6) Chemical Hazards; (7) Military Aircraft; (8) Weather Control Experimentation; and (9) Bacteriological and Biological Hazards. A.W.

N64-24141 School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Medical Div.
DETERMINATION OF THE SOLUBILITY OF NEON IN WATER AND EXTRACTED HUMAN FAT
Kenneth G. Ikels May 1964 8 p refs
(SAM-TDR-64-28; AD-601602)

A gas chromatographic technique in conjunction with a modified Van Slyke apparatus is described for the determination of the Bunsen absorption coefficient (α) for neon in water, olive oil, and extracted human fat. Essentially, the method consists of a double extraction of sample material that was equilibrated at a stated temperature with neon. The gas liberated from the sample is then quantified by gas chromatography. The observed Bunsen absorption coefficient (α) for neon in water agrees closely with the value reported in literature. The present method may be regarded as sufficiently accurate for the determination of neon solubility in biologic fluids, fats, and oils. Present results of the solubility of neon in extracted human fat confirm a prediction that the biologic properties of neon should lie between nitrogen and helium, coming somewhat closer to

the latter. The observed Bunsen absorption coefficients supply new information on the solubility of neon in human fatty material, olive oil, and water. Author

N64-24185 Naval Radiological Defense Lab., San Francisco, Calif.
PRIMER ACTIVITY OF THYMUS DNA FRACTIONATED BY ECTEOLA COLUMN CHROMATOGRAPHY
W. D. Skidmore, R. K. Main, and L. J. Cole 12 Jun. 1963 22 p refs
(USNRDL-TR-655; AD-414704)

The DNA-primer activity of Ecteola fractionated calf- and rat-thymus DNA samples was determined by a DNA-polymerase assay system. All DNA samples assayed, heated or unheated, and fractionated or unfractionated, showed some degree of DNA-primer activity. The chromatographic profiles of heated DNA were different from those of unheated DNA. Phenol and p-aminosalicylate, used in the preparation of DNA, did not alter the patterns of DNA obtained by Ecteola chromatography. Sephadex chromatography was found to be a rapid and effective method to deionize DNA solutions. DNA-primer activity was increased by an ammonium hydroxide gradient. At 4°, treatment of DNA by phenol and p-aminosalicylate, Ecteola column chromatography with a salt gradient, Sephadex column chromatography with deionized distilled water to desalt DNA, and lyophilization did not alter DNA-primer activity. The results indicate that DNA-primer activity, per se, is not specifically associated with one particular fraction of DNA. Author

N64-24234 Utah U., Salt Lake City
VARIABLES RELATED TO ACCURACY IN INTERPERSONAL PERCEPTION Final Report
Victor B. Cline and James M. Richards, Jr. Jan. 1964 31 p refs
(Contract Nonr-19288(04))
(AD-436402)

In order to test for significant differences among the incentive conditions that were used to influence judgment of interpersonal perception, a simple analysis of variance was computed. Results are presented in tabular form. It was found that none of the differences in response are significant and that varying the incentives for accurate judgment did not have any reliable effect upon accuracy. These results were the opposite of what had been predicted. (It had been predicted that a variation in incentives would have some effect on accuracy of interpersonal perception.) R.T.K.

N64-24324 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
ELECTRONIC DIFFERENTIATING DEVICES FOR ANALYSIS OF PHYSIOLOGICAL PROCESSES
Ye. B. Babskiy, V. L. Karpman, G. M. Petrov, and A. I. Skachkova 23 Mar. 1964 12 p Transl. into ENGLISH from Elektron v Med. (Moscow), 1960 p 71–78
(FTD-TT-63-1191/1+2+4; AD-437118)

Electronic devices performing mathematical integration and differentiation have, in recent years, begun to find application in physiology. Thus, integrators are being successfully used in electroencephalographic and electromyographic studies. Electronic differentiating devices for studying cyclic physiological processes make it possible to record both the process under study and its derivatives. The first derivative characterizes the rate of change of the given process, and the second derivative yields its acceleration. Thus, it is possible to obtain data needed for a more complete analysis of the phenomenon under study. A method of study such as this is of significant value in the solution of many questions in the physiology of the motor apparatus and the physiology of blood circulation. J.L.D.

N64-24339 Pennsylvania U., Philadelphia Graduate School of Medicine
HUMAN MECHANICS Four Monographs Abridged
Wilton Marion Krogman and Francis E. Johnston Wright-Patterson AFB, Ohio. AMRL, Dec. 1963 388 p refs
(Contract AF 33(616)-8091)
(AMRL-TDR-63-123; AD-600619)

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4. SPACE REQUIREMENTS OF THE SEATED OPERATOR W. T. Dempster p 214–340 refs (See N64-24343 17-16)

N64-24340 Pennsylvania U., Philadelphia Graduate School of Medicine
THE CENTER OF GRAVITY OF THE HUMAN BODY
W. Braune and O. Fischer *In its* Human Mech. Dec. 1963 p 1–57 (See N64-24339 17-16)

Four cadavers were used to study the location of the center of gravity in the human body. The information gained from the cadavers was used in determining the following: (1) the common center of gravity for the entire body, and for whole sections, from the centers of gravity and weights of separate limbs; (2) the location of the center of gravity on the living human body in different positions and with different loads; (3) the importance of the relations of the location of the gravity line to the supporting surface; (4) the effect of the pliability of the torso on the location of the common center of gravity; and (5) the effect of ground slope on the position of the body. P.V.E.

N64-24341 Pennsylvania U., Philadelphia Graduate School of Medicine
THEORETICAL FUNDAMENTALS FOR A MECHANICS OF LIVING BODIES
O. Fischer *In its* Human Mech. Dec. 1963 p 58–153 (See N64-24339 17-16)

The kinetics of joint systems and the state of motion and equilibrium in man are investigated. Mass systems and fixed points within the individual limbs (main points of the body parts), which are similar to the center of gravity in the kinetics of a single rigid body, are introduced. P.V.E.

N64-24342 Pennsylvania U., Philadelphia Graduate School of Medicine
THE HUMAN MOTOR
J. Amar *In its* Human Mech. Dec. 1963 p 154–214 (See N64-24339 17-16)

The following are discussed with respect to the motor activities of the human body: (1) the general principles of mechanics; (2) the human machine; (3) human energy; (4) man and his environment; (5) experimental methods; and (6) industrial labor. P.V.E.

N64-24343 Pennsylvania U., Philadelphia Graduate School of Medicine
SPACE REQUIREMENTS OF THE SEATED OPERATOR
W. T. Dempster *In its* Human Mech. Dec. 1963 p 215–340 refs (See N64-24339 17-16)

Kinematic and mechanical information obtained in studying the human body is discussed with respect to the work space required by a seated person performing various body movements. The study was concerned with synthesizing realistic manikins, understanding the body kinematics of a seated operator in his work space, and defining the dimensions of the work space. P.V.E.

N64-24487 Joint Publications Research Service, Washington, D.C.

THE STABILITY OF FUNCTIONALLY HETEROGENOUS PORTIONS OF DNA TO IONIZING RADIATIONS

G. Ye. Fradkin 29 Jun. 1964 7 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 155, no. 2, 1964 p 457-460

(JPRS-25282; TT-64-31575)

Reported are the results of a study of the sensitivity of the structural (genetic code, programing protein synthesis) and the regulating mechanism of the DNA of the moderate phagus λ to radiation. The indicator of radiosensitivity of the regulating mechanism was the destruction of the function of the operator chromosome segment, characterized by the appearance of virulent mutants of the moderate phagus λ. N.E.A.

N64-24561 Joint Publications Research Service, Washington, D.C.

MEDICAL AND BIOCHEMICAL INVESTIGATIONS

28 May 1964 18 p refs Transl. into ENGLISH of 2 Articles from Voprosy Med. Khim. (Moscow), v. 10, no. 1, 1964 p 12-15, 77-80

(JPRS-24838; OTS-64-31365) OTS: $0.50

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2. STUDIES OF COMBINATION SPECTRA DISPERSION IN CATECHOLAMINES V. V. Menshikov and A. D. Yesikov p 10-15 refs (See N64-24563 17-16)

N64-24562 Joint Publications Research Service, Washington, D.C.

INCREASE OF SOME BLOOD SERUM ENZYME ACTIVITY DUE TO STRONG STIMULI

A. F. Blyuger, M. L. Belen'kiy, and Ya. Ya. Shuster *In its* Med. and Biochem. Invest. 28 May 1964 p 1-9 refs (See N64-24561 17-16) OTS: $0.50

Experiments were performed to study the activity of several enzymes influenced by strong stimuli. It was shown that under the action of strong stimuli (hypoxia, hypothermia, asphyxia, shock in burns, spasms, nonspecific inflammation, and septicemia caused by *E. coli*), changes in the activity of glutamic-pyroracemic transaminase, glutamic-oxalacetic transaminase, and aldolase took place in the blood serum and tissue. The majority of the stimuli caused an increase of enzyme activity in the serum and tissues. Conditions that permitted the development of acidosis prevented the activity of blood-serum enzymes under the action of strong stimuli. No direct correlation is observed between the increase of serum enzyme activity and tissue enzyme activity. N.E.A.

N64-24563 Joint Publications Research Service, Washington, D.C.

STUDIES OF COMBINATION SPECTRA DISPERSION IN SPECTROFLUOROMETRIC ESTIMATION OF CATECHOLAMINES

V. V. Menshikov and A. D. Yesikov *In its* Med. and Biochem. Invest. 28 May 1964 p 10-15 refs (See N64-24561 17-16) OTS: $0.50

A photoelectronic unit is described for investigating the combination spectra dispersion. It consists of the ISP-51 spectrograph with a photoelectric adapter (FEP-1) and of a unit for analyzing the combination spectra dispersion. The spectra of fluorescence for adrenolutin and noradrenalin, obtained by the oxidation of a base of adrenalin and noradrenaline bitartrate, turned out to be identical to the spectra of fluorescence of urine extracts treated by the same method. The method of spectrofluorometry makes possible the differentiation of the fluorescence of catecholamines from the fluorescence of medicines (quinidine and tetracycline). N.E.A.

N64-24606 Lockheed Missiles and Space Co., Palo Alto, Calif. Research Labs.

A SYMPOSIUM ON TOXICITY IN THE CLOSED ECOLOGICAL SYSTEM

M. Honma and H. J. Crosby, ed. [1963] 325 p refs Symp. held 29-31 Jul. 1963, Palo Alto, Calif.; Sponsored by Navy and Lockheed

(AD-440942)

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17. ATMOSPHERE MONITORING IN THE NUCLEAR SUBMARINE E. Johnson p 223-232 refs (See N64-24623 17-15)

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19. EQUIPMENT FOR ALARM SYSTEMS J. P. Strange p 257-267 refs (See N64-24625 17-15)

20. TRACE CONTAMINANT REMOVAL P. D. Quattrone p 269-283 refs (See N64-24626 17-16)

21. CARBON DIOXIDE REMOVAL, CONVERSION, AND OXYGEN REGENERATION J. M. Smith and R. S. Thomas p 285-303 refs (See N64-24627 17-16)

22. PARTICLE SIZE CONSIDERATIONS OF AIRBORNE CONTAMINANTS C. L. Punte, Jr. p 305-318 refs (See N64-24628 17-16)

23. MEDICAL PROBLEMS IN THE CLOSED ECOLOGICAL SYSTEM H. G. Clamann p 319-322 (See N64-24629 17-16)

N64-24607 Navy Dept., Washington, D.C.
ORIGIN OF CONTAMINATION IN THE NUCLEAR SUBMARINE ATMOSPHERE
Jack L. Kinsey *In* Lockheed Missiles and Space Co., Palo Alto, Calif. A Symp. on Toxicity in the Closed Ecol. System [1963] p 1-8 (See N64-24606 17-16)

The sources of atmospheric contamination and the methods currently used to overcome them in nuclear submarines are discussed. The contaminants discussed include carbon dioxide, carbon monoxide, hydrocarbons, phosphate-ester hydraulic fluids, aerosols, and air ions. M.P.G.

N64-24608 Naval Research Lab., Washington, D.C.
EVOLUTION OF MATERIALS IN THE CLOSED SYSTEM
W. L. Anderson and R. A. Saunders *In* Lockheed Missiles and Space Co., Palo Alto, Calif. A Symp. on Toxicity in the Closed Ecol. System [1963] p 9-18 (See N64-24606 17-16)

The results of analyses of nuclear submarine and spacecraft atmospheres conducted during actual manned operations are discussed. The trace contaminants that have been identified are tabulated, and the suspected source is indicated if known. In the smaller volume of the Mercury spacecraft the contamination problem is even more acute, since a contaminant can reach the maximum allowable concentration more quickly from a small amount of material. It is important that the exact concentration of each contaminant or group of contaminants be established so that toxic effects and maximum allowable limits can be established by toxicologists. M.P.G.

N64-24609 Lockheed Missiles and Space Co., Sunnyvale, Calif.
SCREENING FOR TOXIC MATERIALS IN THE DESIGN ENGINEERING PHASE
John F. Sheehy *In* Lockheed Missiles and Space Co., Palo Alto, Calif. A Symp. on Toxicity in the Closed Ecol. System [1963] p 19-31 refs (See N64-24606 17-16)

The toxicity surveillance program established by the Navy to determine the potential toxicity of materials introduced into the nuclear submarine by the inclusion of the Polaris Missile System is described. Programs to establish those chemicals in materials which, if released into the atmosphere, would constitute a toxic hazard, and to establish the conditions under which an undesirable effluent release occurs, are also discussed. Two other aspects of the basic atmosphere control program considered are contaminant removal, CO_2 removal, and O_2 regeneration. M.P.G.

N64-24610 California U., San Francisco School of Medicine
PHYSIOLOGICAL EFFECTS AND HUMAN TOLERANCES
Charles H. Hine *In* Lockheed Missiles and Space Co., Palo Alto, Calif. A Symp. on Toxicity in the Closed Ecol. System [1963] p 33-53 refs (See N64-24606 17-16)

The biologic factors that must be considered in the design of closed environments and life-support systems for submarines or spacecraft are reviewed. The factors discussed include physical forces, weightlessness, stress, spatial orientation, temperature, radiation, psychological effects of confinement, nutrition, metabolic end products as contaminants, the maximum allowable concentration of chemical contaminants, oxygen tocicity, carbon dioxide, carbon monoxide toxicity, and the effects of drugs. The life-support systems created must take account of both the flexibility and the limits of adaptability of the human body. M.P.G.

N64-24611 School of Aerospace Medicine, Brooks AFB, Tex.
MICROBIOLOGICAL CONTAMINATION AND ITS EFFECTS IN THE CLOSED ECOLOGICAL SYSTEM
Laurence Irvine *In* Lockheed Missiles and Space Co., Palo Alto, Calif. A Symp. on Toxicity in the Closed Ecol. System [1963] p 55-62 refs (See N64-24606 17-16)

Problems associated with microbiological contamination of manned and unmanned spacecraft are considered as follows: (1) the danger of spacecraft failure due to microorganism-caused corrosion or stoppage in secondary or stabilizing fuel lines; (2) the possibility of mutual contamination between two or more alien planets with organisms harmful to man, animals, agriculture, or atmosphere; (3) the danger of culturing pathogens or facultative pathogens as part of the waste regeneration system; and (4) the possible buildup of toxic byproducts and noxious gases from microorganisms within the cabin. The need for new automated analytical techniques for rapid microbial detection and identification, and the need for the development of new diagnostic methodology to provide more precise measurements of the health of a man before he enters the machine, are stressed. M.P.G.

N64-24612 Army Chemical Center, Edgewood, Md. Research and Development Labs.
ANIMAL TEST FOR DETECTION OF SUBTLE TOXIC ACTION OF DRUGS OR CHEMICALS
Bernard P. Mc Namara *In* Lockheed Missiles and Space Co., Palo Alto, Calif. A Symp. on Toxicity in the Closed Ecol. System [1963] p 63-75 ref (See N64-24606 17-16)

Six functional tests on animals under the influence of selected drugs known to produce decrement in human performance are described. These tests differ from the standard toxicological tests in that they measure the subtle impairment of normal performance. Drugs of the following classes were studied: adrenergic, antiadrenergic, anticholinergic, anesthetics, analgesics, and tranquilizers. Positive effects in animals could usually be noted with 1% or less of an LD_{50} dose. Comparisons of the doses that produce decrement of performance in animals and man are presented to demonstrate some of the potential and limitations of functional tests in animals. M.P.G.

N64-24613 National Academy of Sciences—National Research Council, Washington, D.C. Prevention of Deterioration Center
HARMFUL EFFECTS ON MATERIALS AND EQUIPMENT
Carl J. Wessel *In* Lockheed Missiles and Space Co., Palo Alto, Calif. A Symp. on Toxicity in the Closed Ecol. System [1963] p 77-102 refs (See N64-24606 17-16)

A review of published data on the effects of deteriorative environments on materials and equipment is presented. The

factors discussed are limited to those that exist in closed ecological systems such as submarines and space cabins and include the following: water vapor (humidity), liquid water (condensates), moderate heat fluxes, salts, acids, alkalies, oxygen, ozone, sulfur dioxide, nitrogen dioxide, miscellaneous gases and aerosols, and fungi and bacteria. All of these factors can be controlled; however, in the cases of water, oxygen, and moderate heat fluxes, conditions nearly optimum for man are in ranges that could cause low-order deterioration reactions of minor importance over long time periods. M.P.G.

N64-24614 Public Health Service, Cincinnati, Ohio
VALIDITY AND HAZARDS OF EXTRAPOLATING THRESHOLD LIMIT VALUES TO CONTINUOUS EXPOSURES
Herbert E. Stokinger *In* Lockheed Missiles and Space Co., Palo Alto, Calif. A Symp. on Toxicity in the Closed Ecol. System [1963] p 103–123 refs (See N64-24606 17-16)

An equation is proposed for extrapolation of threshold limit values (TLV) for industry atmospheres to conditions of the space capsule, and the risks and validity of such an extrapolation are evaluated. The added factors for space travel represent cabin pressure, altered toxicity due to continuous 90-day exposure, temperature, restricted movement, toxicity from continuous exposure to 100% O_2 at 5 psi, fatigue, and an interaction factor. Some TLV's calculated for space travel are tabulated and discussed. The extrapolated values are considered to be reasonable in many instances; however, the calculated limits are too uncertain to be substituted for additional laboratory work and should therefore be considered as benchmark values until improved estimates are obtained. The urgency of deciding whether a one-gas (O_2) or a two-gas system (O_2 and N_2) will be used in the space capsule atmosphere is stressed because completely different toxicologic effects can be predicted for capsule contaminants in one system rather than the other. M.P.G.

N64-24615 Naval Medical Research Inst., Bethesda, Md. Toxicology Unit
LONG-TERM CONTINUOUS INHALATION STUDIES AT THE U.S. NAVAL TOXICOLOGY UNIT
J. Siegel and R. A. Jones *In* Lockheed Missiles and Space Co., Palo Alto, Calif. A Symp. on Toxicity in the Closed Ecol. System [1963] p 125–134 (See N64-24606 17-16)

The sequence of events leading to the establishment of the Navy toxicology unit and its approach to the inhalation hazards associated with continuous long-term exposure to contaminants in closed atmospheres are outlined. Certain physiological parameters of animals exposed to the chemical contaminant in specially designed exposure chambers are monitored. The general approach is to start at a high contaminant level to get positive reactions, then make a run at the TLV level, and then drop to 1/10 of the TLV or to the point of no effect. Materials on which continuous long-term tests have been completed and materials for which guidelines are being established are listed. The need for standardizing the tests being run under various contracts and grants so that the results will be directly comparable is emphasized. M.P.G.

N64-24616 Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio
THE ENVIRONMENTAL TOXICITY OF SPACE CABIN ATMOSPHERES
A. A. Thomas and K. C. Back *In* Lockheed Missiles and Space Co., Palo Alto, Calif. A Symp. on Toxicity in the Closed Ecol. System [1963] p 135–142 refs (See N64-24606 17-16)

Although spacecraft cabin materials that produce noxious gases and vapors will probably not be much different from those found in submarines, the closed environment of the space cabin poses different problems, such as the management of chemical, algal, bacterial, and perhaps fungal subsystems; cabin operating pressures that will increase the boiloff from common substances; zero-gravity and the delayed settling of particulate matter; radiation decomposition products; and power limitations. To test the validity of extrapolation of industrial TLV's to space conditions, a series of animal experiments were run using a group of metabolic products and a group of propellants. The results indicate that the industrial TLV cannot be used for long-term exposure criteria, and that there are physiological actions and interactions between various contaminants that can be classed as additive, synergistic, or antagonistic. It is suggest that biological evaluations be begun on materials scheduled to be used in research prototype space cabins, so that toxicological data will parallel the developmental schedule. M.P.G.

N64-24617 National Academy of Sciences–National Research Council, Washington, D.C. Advisory Center on Toxicology
PHARMACOLOGICAL ASPECTS OF TOXICOLOGY
Harry W. Hays *In* Lockheed Missiles and Space Co., Palo Alto, Calif. A Symp. on Toxicity in the Closed Ecol. System [1963] p 143–153 refs (See N64-24606 17-16)

The factors that must be considered in the study of the pharmacodynamical effects of a chemical or drug are discussed. These include absorption or route of administration, distribution in the body, method of excretion, metabolism or detoxication mechanisms, sites and mechanism of action, and physical-chemical properties. Other factors influencing the response of the organism include species, sex, weight, age, and temperature, as well as the combinations in which the chemicals are absorbed. The effect of chemicals on enzymes and the effect of enzyme deficiency on drug response are considered. It is predicted that future toxicology studies will be conducted on the cellular level. M.P.G.

N64-24619 Naval Research Lab., Washington, D.C.
DETECTION OF CONTAMINANTS IN THE NUCLEAR SUBMARINE ATMOSPHERE
Homer W. Carhart *In* Lockheed Missiles and Space Co., Palo Alto, Calif. A Symp. on Toxicity in the Closed Ecol. System [1963] p 171–179 refs (See N64-24606 17-16)

Various methods for carbon monoxide analysis are reviewed: direct chemical analysis, catalytic combustion, mass spectrometry, nondispersive infrared techniques, the use of detector tubes, and gas chromatography. Of these methods, the nondispersive infrared technique used in the Mark III analyzer is the most satisfactory. However, in the Mark III, nitrous oxide interferes on an almost 1:1 ratio; i.e., it gives a positive response in the carbon monoxide channel almost equal to that of the monoxide itself. Indirect routine methods, based on adsorption on carbon, and other sampling processes are practiced on nuclear submarines, but the results of the analyses are not available until long after the cruise is over. I.v.L.

N64-24626 National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
TRACE CONTAMINANT REMOVAL
Phillip D. Quattrone *In* Lockheed Missiles and Space Co., Palo Alto, Calif. A Symp. on Toxicity in the Closed Ecol. System [1963] p 269–283 refs (See N64-24606 17-16)

At the present time, a system incorporating an adsorption bed, a catalytic burner unit, and a filtering system to remove aerosols, ions, and particulate matter appears to be feasible for trace contaminant removal. (It is assumed that separate systems are set up for water vapor, carbon dioxide, and oxygen management, and that the contaminant management system is compatible with these systems.) However,

provisions would have to be made for the removal of a number of gaseous products, such as methane, which cannot be completely oxidized in present catalytic burners; the halogen acids that form during the combustion of Freon in a hopcalite burner; and oxides of nitrogen produced by ammonia and other nitrogenous materials. I.v.L.

N64-24627 Lockheed Missiles and Space Co., Palo Alto, Calif.
CARBON DIOXIDE REMOVAL, CONVERSION, AND OXYGEN REGENERATION
J. M. Smith and R. S. Thomas *In its* A Symp. on Toxicity in the Closed Ecol. System [1963] p 285–303 refs (See N64-24606 17-16)

The purpose of this paper is to review allowable carbon dioxide concentration, concepts, and certain devices currently being considered for CO_2 removal and conversion and for O_2 generation for extended manned space flight. Two types of carbon dioxide tolerance relationships are discussed. The first is the permissible limit for continuous exposure. The second is time of exposure vs partial pressure for acute effects. The former will determine the basic design of the removal device; the latter will affect the choice of the backup measures required during both programed and emergency down-times. The three most promising concepts for regenerative CO_2 removal devices—adsorption, electrodialysis, and solidification—are discussed. A number of processes being considered for obtaining O_2 from CO_2 (O_2 generation) are listed as follows: (1) the Sabatier process, (2) direct hydrogenation, (3) electrolysis, (4) the use of a solid electrolyte, (5) CH_4–CO_2 reaction, (6) CH_4 pyrolysis, and (7) hydrocarbon synthesis. I.v.L.

N64-24628 Army Chemical Center, Edgewood, Md. Research and Development Labs.
PARTICLE SIZE CONSIDERATIONS OF AIRBORNE CONTAMINANTS
Charles L. Punte, Jr. *In* Lockheed Missiles and Space Co., Palo Alto, Calif. A Symp. on Toxicity in the Closed Ecol. System [1963] p 305–318 refs (See N64-24606 17-16)

In studies pertaining to air pollution, industrial hazards, or closed-system environments, the size of the airborne particulates is of prime importance. The entry of particles into the respiratory tract, the portion of an inhaled aerosol that is retained in the respiratory tract, and the depth to which the aerosol will penetrate before deposition are all related to particle size. Results of investigations indicate the following: (1) The total retention in the respiratory tract is essentially 100% for particles larger than 10μ. It is about 90% for particles of 5μ, and 75% for particles of 2μ. Retention then drops off rapidly, reaching a minimum of 20% for particles of 0.4μ. (2) Upper respiratory retention (nose and throat) is close to 100% for particles above 10μ. It is about 50% for particles of 2μ and about 5% for particles of 1μ. (3) Particles of 50μ or greater do not enter the nose. I.v.L.

N64-24629 School of Aerospace Medicine, Brooks AFB, Tex.
MEDICAL PROBLEMS IN THE CLOSED ECOLOGICAL SYSTEM
Hans G. Clamann *In* Lockheed Missiles and Space Co., Palo Alto, Calif. A Symp. on Toxicity in the Closed Ecol. System [1963] p 319–322 (See N64-24606 17-16)

Medical problems in a closed ecological system are reviewed briefly in the light of maintaining adequate and even comfortable environmental conditions for crew members so that they may remain at their best physical and mental performance levels. These problems deal with the medical aspects of a habitable cabin atmosphere (cabin pressure) and with regenerative life support systems that recover or convert waste into reusable material. Also, a brief discussion on the maintenance of crew health during an extended space voyage is presented. I.v.L.

N64-24630 Joint Publications Research Service, Washington, D.C.
PECULIARITIES OF THE COURSE OF RADIATION SICKNESS IN MICE SUBJECTED TO TREATMENT WITH MARROW AND BY IMMUNIZATION
O. P. Lebedeva and N. A. Maksimovich 29 Jun. 1964 8 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 155, no. 2, 1964 p 454–456
(JPRS-25277; TT-64-31572) OTS: $0.50

A study of the pathogenic processes and peculiarities of the course of radiation sickness in immunized mice and in irradiated mice treated with bone marrow is presented. A combination of virological and morphological methods is used in the study. N.E.A.

N64-24685 Joint Publications Research Service, Washington, D.C.
TECHNICAL CYBERNETICS, NO. 1, 1964
1 May 1964 320 p refs Transl. into ENGLISH of Izv. Akad. Nauk SSSR, Otd. Tekhn. Nauk: Tekhn. Kibernetika (Moscow), No. 1, Jan.–Feb. 1964 p 1–208
(JPRS-24536; OTS-64-31235) OTS: $5.00

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N64-24690 Joint Publications Research Service, Washington, D.C.

THE MATRIX METHOD OF MINIMIZATION OF THE NUMBER OF INTERNAL STATES OF NON-SYNCHRONOUS FINITE AUTOMATONS

V. G. Lazarev *In its* Tech. Cybernetics 1 May 1964 p 50-54 refs (See N64-24685 17-16) OTS: $5.00

Transfer matrices are investigated that permit description of the function of automatons, the variations in states of which are caused by transfers of the automaton. A method is proposed for minimization of the number of internal states of automatons of a given class, based on use of the method of symmetrical breakdown of the matrix of states. Author

N64-24700 Joint Publications Research Service, Washington, D.C.

A SELF-ADJUSTING SYSTEM WITH A PATTERN—I.

I. N. Krutova and V. Yu. Rutkovskiy *In its* Tech. Cybernetics 1 May 1964 p 185-198 refs (See N64-24685 17-16) OTS: $5.00

The principle of action and some properties of one type of self-adjusting system with a pattern standard are investigated. The pattern in these systems is one of the basic elements of the self-adjusting curve. It may be used for conversion of a control system, or serve as a standard on the basis of which an analysis of the characteristics of the system may be conducted. G.D.B.

N64-24704 Joint Publications Research Service, Washington, D.C.

ON SYNTHESIS OF A CLASS OF AUTOMATIC CONTROL SYSTEMS UNDER RANDOM EFFECTS

G.A. Agasandyan *In its* Tech. Cybernetics 1 May 1964 p 249-263 refs (See N64-24685 17-16) OTS: $5.00

Automatic control systems are investigated that are described by a differential equation of the LaPlace type. The problem of finding optimum parameters of the system is solved with respect to the criterion of minimum least square error. The peculiarities of such systems are pointed out. Author

N64-24705 Joint Publications Research Service, Washington, D.C.

ON A PROBLEM OF EVALUATION OF ESSENTIAL PARAMETERS OF AN OBJECT

V. P. Zhivoglyadov and Ye. P. Maslov *In its* Tech. Cybernetics 1 May 1964 p 264-274 refs (See N64-24685 17-16) OTS: $5.00

This is an investigation of the application of the theory of statistical solutions to a problem in evaluation of the essential parameters of an object. In an example illustrating the general method, an algorithm is obtained for finding an unknown parameter of a nonlinear object. Author

N64-24706 Joint Publications Research Service, Washington, D.C.

SYNTHESIS OF AUTOMATIC CONTROL SYSTEMS WITH VARIABLES STRUCTURE HAVING A DISCONTINUOUS SWITCHING FUNCTION

S. V. Yemel'yanov and N. Ye. Kostyleva *In its* Tech. Cybernetics 1 May 1964 p 275-281 refs (See N64-24685 17-16) OTS: $5.00

An automatic control system is investigated with variable structure for control of objects with zeros in the transfer function. A new system of coordinates is introduced that is related to the initial ones, with the help of several operators in which the phase trajectories are continuous. A control law is obtained for which the switching hyperplane in this new space occupies a fixed position. The conditions are introduced for producing a sliding region in the entire switching hyperplane. Author

N64-24707 Joint Publications Research Service, Washington, D.C.

OPTIMAL TRANSFER PROCESSES IN A SYSTEM WITH FORECASTING

N. N. Mikhaylov and Zh. A. Novosel'tseva *In its* Tech. Cybernetics 1 May 1964 p 282-294 refs (See N64-24685 17-16) OTS: $5.00

Phase trajectories are investigated for optimal intermediate processes in a system of the third order, consisting of an oscillatory link and an integrator. A method of control is investigated for such a system with the use of forecasting, and results of simulation are presented. Author

N64-24708 Joint Publications Research Service, Washington, D.C.

STABILIZATION OF A SYSTEM OF CONTROL BY INTRODUCTION OF A NON-LINEAR CORRECTION

Ye. D. Viktorov *In its* Tech. Cybernetics 1 May 1964 p 295-304 refs (See N64-24685 17-16) OTS: $5.00

The control stability of a special type with variable parameters by the method of "frozen coefficients" is investigated. It is shown that stability cannot be insured by a linear regulator with constant parameters. A system is proposed for "self-adjusting" filters, the introduction of which permits achievement of stable auto-oscillations. The operation of the control system with the filter is investigated by the means of harmonic balance. Author

N64-24807 Horizons Incorporated, Cleveland, Ohio

DIFFUSION OF GASES THROUGH PLASTIC MEMBRANES Final Report

[1962] 21 p refs

(Contract Nonr-446)
(AD-437359)

Progress is reported on a project designed to obtain data on the factors involved in the extraction of oxygen from sea water by diffusion through thin plastic membranes. It is hoped that these data might be useful in estimating the feasibility of an undersea life-supporting gill based on this principle. Although this general type of system can use either a gas or a liquid on either side of the membranes, this work is primarily concerned with using oxygenated water on the outside and respired air on the inside of the membranes. A few preliminary experiments were also done on the direct oxygenation of blood by passing it between two membranes separated by a screen. R.T.K.

N64-24815 National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

EFFECTS OF HIGH SUSTAINED ACCELERATION ON PILOTS' PERFORMANCE AND DYNAMIC RESPONSE

Melvin Sadoff Washington, NASA, Jul. 1964 61 p refs
(NASA-TN-D-2067) OTS: $1.50

A study was conducted on the human centrifuge to determine the effects of sustained high acceleration on pilot control capabilities. The results showed that the predominant effect of acceleration stress was an increased attenuation of the pilot's dynamic response and an associated large increase in his errors at the higher frequency components in the task command input function. Author

N64-24967 Battelle Memorial Inst., Columbus, Ohio Radiation Effects Information Center

THE BENEFICIAL USES OF RADIATION EFFECTS

J. E. Drennan, D. J. Hamman, and E. N. Wyler 16 Jun. 1964 24 p refs
(Contract AF 33(657)-10085)
(REIC MEMO-25; AD-601493)

The report summarizes beneficial uses of the penetrating abilities of the radiation energies, the use of radiation energies to provide illumination, the exploitation of these energies as a source of useful power, and the use of the radiation energies to change materials and thus make new or improved products. Author

N64-24972 Martin Co., Baltimore, Md.

HUMAN VIBRATION AND IMPACT PROTECTION BY AIRBAG RESTRAINT SYSTEMS

Carl C. Clark and Carl Blechschmidt N.Y., AIAA [1964] 6 p Presented at the 1st AIAA Ann. Meeting, Washington, D.C., 29 Jun. - 2 Jul. 1964
(Contract NASw-877)
(AIAA Paper-64-220) AIAA: $0.50 members, $1.00 nonmembers

Manned impact tests of airbag restraint systems in a preliminary experimentation box, a spacecraft simulator, and a passenger airplane simulator have been carried out to show the conceptual feasibility of such active elastic restraint systems, whose restoring forces can be varied by varying bag pressures to insure the prevention of "bottoming." These systems can isolate from high-frequency (above 5 cps) vibration and impact loads, transmitting less than 50% and often less than 25% of the loads on the "vehicle." Rebound effects occur at a low enough frequency (near 3 cps) that they are physiologically acceptable, without any bag pressure dumping or valving. Author

N64-25000 National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

MEASURED VARIATIONS IN THE TRANSFER FUNCTION OF A HUMAN PILOT

James J. Adams and Hugh P. Bergeron Repr. from J. of Aircraft, v. 1, no. 2, Mar.-Apr. 1964 p 77-81 Presented at the AIAA/ASD (AFSC) Vehicle Design and Propulsion Meeting, Dayton, Ohio, 4-6 Nov. 1963
(NASA-RP-206)

A method for determining the transfer function of a human pilot as he operates on a closed-loop control system was devised and used in single-axis compensatory tracking tasks and two-axis tasks both with and without cockpit movement. The transfer functions were then used analytically to obtain closed-loop characteristics. Author

N64-25040 School of Aerospace Medicine, Brooks AFB, Tex.

CONTROLLED CONTAMINATION: A PRACTICAL APPROACH FOR DEVELOPING STERILIZATION PROCEDURES FOR SEALED COMPONENTS OF SPACECRAFT

Joseph T. Cordaro, Henry Buchanan, Bruce Mann, and A. K. Miller (Lockheed Missiles and Space Co.) Sep. 1963 10 p refs
(Contract AF 41(609)-1544)
(SAM-TDR-63-73; AD-437645) OTS: $1.10

Deliberate contamination of components during manufacture appears both practical and feasible for developing sterilization procedures for spacecraft components. Thus, it is possible to determine whether normal manufacturing procedures are sufficient to sterilize or whether the sterilization procedures required (e.g., temperature-time intervals for dry heat) to sterilize can be accomplished without component damage. Methods are presented for controlled contamination with bacterial spores highly resistant to dry heat and bacteriologic recovery of such spores. Impregnated (e.g., with polybutylene) capacitors were rendered sterile during manufacture; nonimpregnated capacitors were not. Any damaging effects of heat sterilization might be increased if the components were subjected to further heating when installed in circuits of spacecraft instrumentations. Author

N64-25054 National Aeronautics and Space Administration, Washington, D.C.

ACCELEROMETRIC PRECORDIAL BALLISTOCARDIOGRAM (KINETOCARDIOGRAM) IN HYPERTENSION [AKTSELEROMETRICHESKAYA PREKARDIAL'NAYA BALLISTOKARDIOGRAMMA (KINETOKARDIOGRAMMA) PRI GIPERTONICHESKOY BOLEZNI]

I. Ye. Oranskiy Jul. 1964 10 p refs Transl. into ENGLISH of Terap. Arkh. (Moscow), v. 34, no. 12, 1962 p 27-32
(NASA-TT-F-198) OTS: $0.50

The phase structure of the cardiac cycle in hypertension was determined by analysis of the kinetocardiogram (KCG). The observations included 70 patients between the ages of 19 and 77. In 39 of the patients the basic condition was accompanied by atherosclerotic cardiosclerosis. The changes in hemodynamics that occur in hypertension were found to be mainly connected with changes in strength and time in the isometric contraction phase and in the phase of ejection of blood from the ventricles. Author

N64-25078 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

PRINCIPLE OF THE DOMINANT AND A. A. UKHTOMSKIY'S CONCEPT OF THE CHRONOTOPE (TIME-SPACE COMPLEX)

V. L. Merkulov 25 Mar. 1964 33 p refs Transl. into ENGLISH from USP. Sovrem. Biol. (Moscow), v. 47, no. 2, 1959 p 204-219 refs
(FTD-TT-63-1806/1+4; AD-600157)

This article tries to systematize Soviet scientist A. A. Ukhtomskiy's published and unpublished material on the chronotope, and compares it to the theories of I. M. Sechenov and N. Y. Wedensky. These theories occurred in his principle

of the dominant and in his chronotope concept. The dominant principle is further discussed and compared with Ukhtomskiy's reasoning concerning the interaction between the dominant and the perception of the chronotope by human and animal sense organs and brain. G.D.B.

N64-25111 California U., Davis School of Veterinary Medicine

THE EFFECTS OF X-RADIATION ON WORK CAPACITY AND LONGEVITY OF THE DOG Annual Progress Report No. 13

A. C. Andersen Jun. 1964 185 p refs
(Contract AT(04-3)-472)
(UCD-472-109) OTS: $2.75

A colony of beagles is in its 13th year of existence as a project to determine work capacity and longevity in dogs exposed to X-radiation. The report lists the beagles by subgroup, gives the present status of the experimental colony, gives opthalmoscopic findings in experimental dogs, presents six psychological studies in irradiated adult female beagles, discusses the effect of X-irradiation on reproduction by female beagles, presents a pathology report on the beagles, and discusses survival of X-irradiated beagles. G.D.B.

N64-25115 IIT Research Inst., Chicago, Ill. Life Sciences Div.

SURVIVAL OF MICROORGANISMS IN A SIMULATED MARTIAN ENVIRONMENT. II *BACILLUS SUBTILIS* VAR. *GLOBIGII*

C. A. Hagen, E. J. Hawrylewicz, and R. Ehrlich Repr. from Appl. Microbiol., v. 12, no. 3, May 1964 p 215–218 refs
(Contract NASr-22)

Survival of *Bacillus subtilis* of the variety *globigii* in a simulated Martian environment was demonstrated. Previous contact with the simulated Martian soil or atmosphere reduced germination or outgrowth of unheated spores, or both. Inoculation into simulated Martian soil and then flushing with a simulated Martian atmosphere were lethal to both vegetative cells and spores. After one diurnal temperature cycle (26° to −60° C), the majority of cells present were spores. No further effect of the diurnal cycle on survival was noted in any of the experimental samples. Author

N64-25125 Bolt, Beranek, and Newman, Inc., Cambridge, Mass.

NEURAL MECHANISMS FOR RESPONSES OF MIDDLE EAR MUSCLES Final Report, 1 Jan. 1962–31 Dec. 1963

William D. Neff [1963] 40 p refs
(Contract DA-49-193-MD-2230)
(Rept.-1128; AD-439381)

In the experiments summarized in this report, the aim was to observe and record the activity of the middle ear muscles under different conditions of reflex arousal by sound and to study the neural control circuitry by noting the effects of central nervous system lesions involving different pathways and centers thought to be part of the control circuitry. G.D.B.

N64-25127 George Washington U., Washington, D.C.

PIONEER VI REPORTED VISUAL SENSATIONS AS A FUNCTION OF SUSTAINED SENSORY DEPRIVATION AND SOCIAL ISOLATION Research Memorandum

Donald B. Murphy, Thomas I. Myers, and Seward Smith Nov. 1963 136 p refs
(Contract DA-44-188-ARO-2)
(AD-439431)

Tests for reported visual sensation were administered to subjects undergoing voluntary sensory deprivation and social isolation and to subjects in a control condition characterized by a normal range of sensory and social experiences. The results of this research are reported. G.D.B.

N64-25132 National Aeronautics and Space Administration, Washington, D.C.

PROBLEMS OF SPATIAL PERCEPTION AND SPATIAL CONCEPTS

B. G. Anan'yev and B. F. Lomov, ed. Jun. 1964 278 p refs
Transl. into ENGLISH of the book "Problemy Vospriyatiya Prostranstva i Prostranstvennykh Predstavleniy" Moscow, Izd. Akad. Ped. Nauk RSFSR, 1961
(NASA-TT-F-164) OTS: $4.00

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N64-25133 National Aeronautics and Space Administration, Washington, D.C.

THE SYSTEMIC MECHANISM OF SPATIAL PERCEPTION AND THE SYNERGETIC ACTIVITY OF THE CEREBRAL HEMISPHERES

B. G. Anan'yev *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 4–11 (See N64-25132 17-16) OTS: $4.00

There is a fundamental similarity between the mechanism of spatial perception and perception in general, which is based on a complex conditioned reflex response to a complex stimulus. The mechanism of spatial perception and its outstanding features are discussed. Experimental evidence is cited that demonstrates that the systemic mechanism of spatial perception is a combination of intermodal associations based on complex conditioned reflexes and the synergetic distinctively human dynamics of the symmetry and asymmetry of the functions of the organs of perception. R.T.K.

N64-25134 National Aeronautics and Space Administration, Washington, D.C.

THE FUNCTIONAL STRUCTURE OF SPATIAL ANALYSIS

E. Sh. Ayrapet'yants *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 12–27 (See N64-25132 17-16) OTS: $4.00

The mechanisms of spatial relations in the behavior of animals and the pathways and structure of spatial analysis, particularly in the areas of higher nervous activity are discussed. The combined role of motor responses and cutaneous activity in spatial analysis is stressed. R.T.K.

N64-25135 National Aeronautics and Space Administration, Washington, D.C.

ASPECTS OF THE SYNERGETIC ACTIVITY OF THE CEREBRAL HEMISPHERES IN CERTAIN VERTEBRATES

E. Sh. Ayrapet'yants and V. L. Bianki *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 28–33 (See N64-25132 17-16) OTS: $4.00

Experimental evidence is presented that the synergetic activity of the cerebral hemispheres is important for visual spatial analysis. There is reason to believe that in vertebrates at different phylogenetic levels visual spatial orientation is related to the functional interaction of the symmetric centers of paired cerebral formations. R.T.K.

N64-25136 National Aeronautics and Space Administration, Washington, D.C.

ELECTROENCEPHALOGRAPHIC INDICATORS OF BINOCULAR VISION AND DISTURBANCE IN BINOCULAR VISION

A. N. Dobromyslov *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 34–44 (See N64-25132 17-16) OTS: $4.00

Objective evidence of the relation between the conical endings of the visual analyzer in binocular vision, and when such vision is disturbed, is provided by the EEG (electroencephalogram) investigations carried out on 120 subjects with binocular and nonbinocular vision. To study the functional state of the cortical endings of the visual analyzer, experiments were also run on puppies with disturbance of binocularity. Records were made of the biocurrents in the occipital region. In addition, the critical fusion frequency in 141 persons, normal subjects and patients with disturbed binocularity, was investigated. R.T.K.

N64-25137 National Aeronautics and Space Administration, Washington, D.C.

ON THE MENSURATIONAL FUNCTION OF THE ANALYZERS

B. F. Lomov *In its* Probl. in Spatial Perception and Spatial Concepts Jun. 1964 p 45–52 refs (See N64-25132 17-16) OTS: $4.00

The mensurational function and the characteristics of the sensory measurement of space are discussed. The perception of distance is one of the most general functions of the analyzers. In one form or another it appears in orientation, synthesis of shapes, measurement, verification, and correction. R.T.K.

N64-25138 National Aeronautics and Space Administration, Washington, D.C.

ON THE ROLE OF THE OCULOMOTOR SYSTEM IN SPATIAL VISION

L. I. Leushina and Ye. P. Kok *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 53–63 refs (See N64-25132 17-16) OTS: $4.00

In order to analyze the role of eye movements in spatial vision and to study the mechanisms of spatial vision, the oculomotor system in patients with defective spatial perception was investigated. To record the eye movements, the electrooculographic (EOG) method was used. All patients with defective spatial perception showed a derangement of the sensory link of the oculomotor system. The degree of defectiveness of spatial vision corresponded to the degree of derangement of the sensory link. R.T.K.

N64-25139 National Aeronautics and Space Administration, Washington, D.C.
THE CONDITIONED REFLEX BASIS OF THE VISUAL PERCEPTION OF SPACE
B. Kh. Gurevich *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 64–71 (See N64-25132 17-16) OTS: $4.00

Using the electro-oculographic method, the "visual" and the conditioned reflex movements in the fixation reflex (the rotation of the eyes toward light) were studied in normal subjects. The results of the investigation suggest that the apparent contradiction between the "peripheral" theories of spatial perception (Sherrington) and the "central" or "centrifugal" theories (Helmholtz) can be removed by the consistent extension of Pavlov's conditioned reflex theory to the sensory arcs of the reflexes—the sensory links of behavior. R.T.K.

N64-25140 National Aeronautics and Space Administration, Washington, D.C.
ON THE ACTIVE NATURE OF PERCEPTION OF THE DISTANCE OF MOVING OBJECTS
V. Ya. Dymerskiy *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 72–77 refs (See N64-25132 17-16) OTS: $4.00

Perception of motion is based on the reflection of space–time relationships. On the basis of mathematical formulas that are given, and experiments that have been conducted, the following is concluded: Under conditions of motion, the perception of the absolute distance of an object occupying the whole visual field and of changes in its absolute distance is possible only on the basis of a particular system of stimulation. In addition to stimulations of the retina, this system must include stimulations produced by the work of the eye muscles, which insures the particular position and nature of motion of the line of regard. This conclusion is valid both for the case of motion of an object relative to a fixed observer and for the case of motion of the observer himself. R.T.K.

N64-25141 National Aeronautics and Space Administration, Washington, D.C.
SOME INDIVIDUAL DIFFERENCES IN PERCEPTION OF DEPTH
A. V. Skripchenko *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 78–82 (See N64-25132 17-16) OTS: $4.00

The experiment reported was designed to investigate certain individual peculiarities in depth perception with one object moving toward or away from the subject, while another object was fixed. For this purpose a modified Howard–Dolman instrument was used. Analysis of the experimental data shows considerable individual variations in accuracy and consistency in determining the equidistance of moving and fixed objects. Stereoscopic sensitivity varied with the direction of movement of the moving object. One group of subjects was able to determine equidistance between a fixed object and an object moving toward the eyes. In another group of subjects depth perception was almost independent of the direction of movement of the object, but stereoscopic sensitivity varied. In the majority of cases the errors in the accuracy of determining equidistance was distributed asymmetrically. No direct correlation was found between the accuracy and consistency of determinations of equidistance. R.T.K.

N64-25142 National Aeronautics and Space Administration, Washington, D.C.
METHOD FOR INVESTIGATING THRESHOLDS OF SPATIAL DISCRIMINATION BY THE HUMAN FINGERS
R. A. Kharitonov *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 83–95 (See N64-25132 17-16) OTS: $4.00

A method is proposed for investigating proprioceptive gnosis of the fingers. The full examination of one subject takes about 30 minutes. The method permits a study of the different thresholds of spatial discrimination in active touch. Investigation of the recognition of equality makes it possible to judge the relative evaluation of first and second stimuli and the phenomenon of lateralization, when the stimuli are presented to the right and left hands simultaneously or successively. Using this method, it is possible to judge the positive influence of dominance of one of the cerebral hemispheres on spatial discrimination in active touch. R.T.K.

N64-25143 National Aeronautics and Space Administration, Washington, D.C.
THE ROLE OF SPEECH IN THE REFLECTION OF SPACE
A. V. Yarmolenko *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 96–99 (See N64-25132 17-16) OTS: $4.00

By studying the formation of complex spatial notions in normal and pathological subjects, it was concluded that these notions fall into two types—the route map and the survey map. The data on the individual development of spatial notions in children demonstrate the relation between these two types as stages in the development of a spatial system of notions and their conversion to a system of spatial concepts. The second type is a later and a higher phenomenon, since the reference points and aspects of the space are localized in a relatively constant fashion, are objective, and are independent of the relative movements of the perceiver. The generalized relationship between the concepts and the notions determines a system of verbally expressed spatial concepts. R.T.K.

N64-25144 National Aeronautics and Space Administration, Washington, D.C.
DEVELOPMENT OF TEMPORARY CONNECTIONS BASED ON THE SPATIAL RELATIONS OF STIMULI IN YOUNG CHILDREN
A. N. Znamenskaya *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 100–107 (See N64-25132 17-16) OTS: $4.00

The object of this investigation was to clarify the role of the motor and visual analyzers in the formation of conditioned reflex responses to the spatial position of objects. Normally developing children who ranged in age from 3 to 4 months and from 2 to 4 years were used as subjects. The study was based on the conditioned-reflex motor method. On the basis of the experiments the following conclusions were drawn: (1) In the development of temporary connections and differentiation of spatial objects in infants 3 to 4 months old, as well as in children 2 to 4 years old, the mechanism of accommodation is important, but the motor analyzer plays the main role. (2) Under these conditions direct stimuli are of extremely great importance to children 2 to 4 years old, while the role of verbal signals remains secondary. R.T.K.

N64-25145 National Aeronautics and Space Administration, Washington, D.C.
DEVELOPMENT OF SPATIAL DISCRIMINATION IN CHILDREN OF PRESCHOOL AGE
M. V. Vovchik-Blakitnaya *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 108–114 (See N64-25132 17-16) OTS: $4.00

The object of the investigation was to clarify the nature and means of discrimination of the spatial position of objects by preschool children, as well as to investigate orientation in a plane. In addition to systematic observations of children engaged in various practical activities and at play in kindergarten, natural experiment was performed—play with objects

and games of lotto with the images of objects in various positions on the cards. These experiments were intended to determine the ability of children to correlate the position of objects in space with the position of their plane images, and also their ability to verbalize the content of the corresponding concepts. R.T.K.

N64-25146 National Aeronautics and Space Administration, Washington, D.C.
MASTERY OF THE SIZE OF OBJECTS BY PRESCHOOL CHILDREN
V. K. Kotyrlo *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 115–120 (See N64-25132 17-16) OTS: $4.00

The object of this investigation was to trace the process of the perception of the size of objects in the spatial orientation of preschool children in different age groups. The discrimination by children of the overall size of an object, representing some combination of its three dimensions (height, length, and width) and in the discrimination of each of its three dimensions separately, was studied. Eighty kindergarten pupils, 3 to 7 years old, were the subjects. Experimental results demonstrated that the apprehension of the size of objects by preschool children is most closely tied to the development of the differentiation, abstraction, and generalization of the different spatial attributes of objects of the material world. As the general spatial orientation of preschool children develops, their apprehension of size also improves. R.T.K.

N64-25147 National Aeronautics and Space Administration, Washington, D.C.
THE DEVELOPMENT OF AN UNDERSTANDING OF SPATIAL RELATIONS AND THEIR REFLECTION IN THE LANGUAGE OF CHILDREN OF PRESCHOOL AGE
T. A. Museyibova *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 121–129 (See N64-25132 17-16) OTS: $4.00

The results of the study of the child's ability to discriminate spatial relations between objects are presented. An analysis of the material obtained as a result of getting the children to perform various individual tasks shows that acquiring the ability to differentiate spatial relations is a long and complicated process. The disentangling of spatial relations—their abstraction from objects—is a difficult mental task for the small child. The data that were accumulated confirm this observation. R.T.K.

N64-25148 National Aeronautics and Space Administration, Washington, D.C.
THE DEVELOPMENT OF SPATIAL PERCEPTION AND SPATIAL CONCEPTS IN PRESCHOOL CHILDREN
B. A. Sazont'yev *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 130–143 (See N64-25132 17-16) OTS: $4.00

As shown by experiments involving drawing tasks (drawing a toy or some other object), the chief difficulty encountered by preschool-age children is that they are still not capable of spatial perception and have not acquired the habit of depicting space on a sheet of paper. Preschool children do not comprehend the significance of such rules as taking into account the position of the object relative to the draftsman's eye or drawing the object from a single fixed viewpoint. During an experiment in which children were instructed to explore and find the simplest ways of drawing objects in three dimensions, it was found that the spatial perception of nature becomes properly coordinated and complemented by a concern for the third dimension. R.T.K.

N64-25149 National Aeronautics and Space Administration, Washington, D.C.
DIRECTED PERCEPTION OF PROPORTIONS BY FIRST-GRADE PUPILS DURING NATURE DRAWING
Yu. M. Mukhin *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 144–148 refs (See N64-25132 17-16) OTS: $4.00

An investigation is described of the process of directed perception of proportions in first-grade students observed during nature drawing studies. These investigations were primarily focused on clarifying the conditions necessary for the formation of directed perception of proportions, in order to gain, through an analysis of these conditions, a somewhat closer understanding of the psychological aspects of the problem. R.T.K.

N64-25150 National Aeronautics and Space Administration, Washington, D.C.
RELATIONSHIP BETWEEN SPATIAL AND QUANTITATIVE CONCEPTS IN STUDENTS IN THE FOURTH TO SIXTH GRADES
Ye. P. Tonkonogaya *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 149–160 (See N64-25132 17-16) OTS: $4.00

The ability to perceive relations between spatial and quantitative concepts independently increases with the accumulation of knowledge in the course of formal education. However, this process is a very slow one. Fourth-grade pupils can distinguish spatial relations independently and independently synthesize spatial and quantitative concepts in mapping routes and in solving arithmetic problems with the aid of a sketch. R.T.K.

N64-25151 National Aeronautics and Space Administration, Washington, D.C.
DEVELOPMENT OF SPATIAL CONCEPTS IN ELEMENTARY SCHOOL PUPILS
O. I. Galkina *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 161–169 ref (See N64-25132 17-16) OTS: $4.00

The methods used were psychological and pedagogical observations made during lessons, control and independent projects in the classroom, individual psychological experiments, and conversations with individual children. Because of the difficulty of determining the spatial concept, various methods of objectifying it in terms of the products of the children's various activities were used—drawing, modeling, sketching, problem solving, story telling, handicrafts, etc. The experimental results concluded that there is a gap between the children's spatial concepts and the end of their primary school education and the demands of the curriculum. R.T.K.

N64-25152 National Aeronautics and Space Administration, Washington, D.C.
PERCEPTION OF SPATIAL RELATIONS BY SIXTH GRADE PUPILS DURING FIELD SURVEYING EXERCISES
V. I. Zykova *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 170–177 (See N64-25132 17-16) OTS: $4.00

The perception of spatial relations was investigated in pupils engaged in field surveying exercises under the sixth-grade geometry program. These exercises are very important in connection with the technical education of the students and as demonstrations of the practical aspects of geometry. Experimental results indicated the following: (1) Discrimination between clockwise and counterclockwise directions in designating the vertices of a survey polygon raises the students to a high level of perception of spatial relations in drawing the corresponding plan, and thereby contributes to reducing the number of cases of mirror-image reversal, (2) Improving the spatial perception of the students to a level at which analogous problems can be solved depends on the specific means by which the necessary stage of perception of spatial relations is reached in the process of drawing survey plans. R.T.K.

N64-25153 National Aeronautics and Space Administration, Washington, D.C.
PERCEPTION AND REPRESENTATION OF THE SHORTEST DISTANCE ON THE MAP AND ON THE GLOBE
F. N. Shemyakin *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 178–187 (See N64-25132 17-16) OTS: $4.00

Subjects associated the verbal formulation of the straight-line axiom with the sensory generalization of their experience in moving over comparatively small portions of the earth's surface, within which its curvature has virtually no effect. There is a lack of generalized sensory experience in recognizing the shortest distance on the surface of a sphere, with which the words "shortest distance" could be associated. R.T.K.

N64-25154 National Aeronautics and Space Administration, Washington, D.C.
KINESTHETIC SPATIAL DISCRIMINATION IN THE PRACTICE OF SPORTS
A. Ts. Puni *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 188–198 refs (See N64-25132 17-16) OTS: $4.00

This report on kinesthetic spatial discrimination in sports is devoted to a survey of the accumulated findings concerning only one of the aspects of this highly complex problem, that pertaining to man's perception of the spatial properties of the movements of his own body. The facts presented show that systematic sports training greatly improves the analytic-synthetic activity of the motor analyzer in athletes. Evidence is presented indicating that the development of kinesthetic spatial discrimination is based not only on improvements in the activity of the motor analyzer, but also on interaction between this analyzer and the speech-signaling system. R.T.K.

N64-25155 National Aeronautics and Space Administration, Washington, D.C.
THE DYNAMICS OF THE SPATIAL ATTRIBUTES OF MOVEMENTS IN THE PROCESS OF FORMATION OF IMAGES OF GYMNASTIC EXERCISES
Ye. N. Surkov *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 199–206 refs (See N64-25132 17-16) OTS: $4.00

The dynamics of the spatial attributes of movements in the process of forming images of gymnastic exercises was studied by means of psychopedagogical experiments. Material related to the teaching of forward handsprings is presented. The subjects were pupils in the sixth and seventh grades. There were 10 subjects, all new to acrobatics. A total of 200 experiments were performed. The process of forming motor concepts was studied in connection with the determining influence of different methods of pedagogical instruction. R.T.K.

N64-25156 National Aeronautics and Space Administration, Washington, D.C.
INTERACTION OF THE SPATIAL, DYNAMIC, AND TEMPORAL COMPONENTS OF THE WORKING MOVEMENT IN LEARNING TO FILE METAL
V. Ye. Bushurova *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 207–213 ref (See N64-25132 17-16) OTS: $4.00

In filing, the effect of the tempo of the movements on their amplitude and intensity was studied. The variations in the chief characteristics of the movements when various analyzers were partially or wholly eliminated were investigated. The results show that, on the whole, the elimination of different analyzers does not have a very marked effect on performance, especially in the performance of a skilled worker. The higher the level of skill attained by the worker the less is the effect. Even with vision, hearing, touch, and the sense of vibration "eliminated," kinesthesia insures the sufficiently distinct analysis of all the characteristics of the working movement. Therefore, the experiment demonstrates that it is actually kinesthesia that plays the leading role in the analysis of time, pressure, and the trajectory of the movements. R.T.K.

N64-25157 National Aeronautics and Space Administration, Washington, D.C.
THE ROLE OF SPATIAL PERCEPTION IN WORK AT A CONVEYER
B. A. Fedorishin *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 214–218 (See N64-25132 17-16) OTS: $4.00

The studies reported were conducted in Leningrad in plants employing the belt-conveyer system of production. Results demonstrated that the workers' perception of space and spatial relations play a significant role in the success with which a given production operation is mastered and executed at a required speed. At the same time, these observations enabled the isolation, from the complex of spatial perception of those elements that have the greatest effect on the working process of the individual worker. R.T.K.

N64-25158 National Aeronautics and Space Administration, Washington, D.C.
SOME PROBLEMS OF THE PSYCHOPHYSIOLOGY OF ILLUSIONS OF THE SPATIAL POSITION OF AIRCRAFT IN INSTRUMENT FLYING
Ye. A. Derevyanko, Ye. S. Zav'yalov, and T. Kh. Gurvich *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 219–230 (See N64-25132 17-16) OTS: $4.00

By means of discussions and questionnaires the frequency, duration, and conditions of occurrence of illusions in flying personnel was determined. Methods of combatting these illusions were investigated. Flight experiments were organized in a specially equipped aircraft in order to study: (1) the characteristics of instrument flying; (2) the possibilities of maintaining horizontal flight without receiving visual information; (3) the effect of acceleration on spatial orientation in instrument flying; and (4) the effect of acceleration on the determination of spatial position when the observation of instrument readings is interrupted. R.T.K.

N64-25159 National Aeronautics and Space Administration, Washington, D.C.
THE ROLE OF SPATIAL CONCEPTS IN MAP READING AND THE INTERPRETATION OF AERIAL PHOTOGRAPHS
M. V. Gamezo and V. F. Rubakhin *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 231–246 (See N64-25132 17-16) OTS: $4.00

The results of solving a series of experimental problems—drawing relief by means of contour lines from given elevation; analysis of relief forms depicted on the map by contour lines with a deliberate error; reproduction of terrain elements based on a preliminary study of maps and aerial photographs, etc.—conclude that the interpretations formed by reading a topographic map or interpreting an aerial photograph create conceptual problems. The mind visualizes these maps and photos either in the form of two- or three-dimensional images of real terrain or in the form of conventionally schematized, reduced images essentially resembling a relief model or a schematic representation of the terrain with individual massive elements; these forms of images may be products of either the memory or the imagination. R.T.K.

N64-25160 National Aeronautics and Space Administration, Washington, D.C.
THE ROLE OF SPATIAL IMAGINATION IN THE WORK OF THE DESIGNER AND IN THE TEACHING OF DRAWING IN TECHNICAL SCHOOLS

Ye. L. Surin *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 247–253 (See N64-25132 17-16) OTS: $4.00

The teaching of descriptive geometry is discussed. It is felt that the nonaxial method of drawing reduces the gap between descriptive geometry and technical drawing. Evidence is presented indicating that it would be profitable to dispense with Monge's method of teaching descriptive geometry. The nonaxial method of making complex drawings is recommended instead. R.T.K.

N64-25161 National Aeronautics and Space Administration, Washington, D.C.

CONTRIBUTION TO THE EXPERIMENTAL INVESTIGATION OF SPATIAL IMAGINATION

B. F. Lomov *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 254–262 (See N64-25132 17-16) OTS: $4.00

The object of this investigation of students of drawing and design was to study the process of conceptualization or, more exactly, the process of operation with spatial images. On the basis of the experimental results it is concluded that the process of formation of a mental operation on a spatial image involves three main stages: (1) working with a real object, (2) external operations on an imagined object, and (3) mental operations on the concept. R.T.K.

N64-25162 National Aeronautics and Space Administration, Washington, D.C.

VISUAL SPATIAL DISCRIMINATION AS A COMPONENT OF THE CAPACITY FOR WORK

M. D. Aleksandrova *In its* Probl. of Spatial Perception and Spatial Concepts Jun. 1964 p 263–273 refs (See N64-25132 17-16) OTS: $4.00

An investigation was made of the evolution of the analyzer functions of man with age. The simplest and most general factors in spatial discrimination responsible for effective regulation of motor actions were examined. Such factors include, primarily, the field and acuity of vision. The simplest forms of visual estimation, which is a result of visual-motor coordination, was also measured. The subjects consisted of 11 persons, 50 to 80 years old, who were still active in work and in social life. R.T.K.

N64-25163 Joint Publications Research Service, Washington, D.C.

FIRST GROUP FLIGHT INTO OUTER SPACE: 11–15 AUGUST 1962

29 Jun. 1964 172 p refs Transl. into ENGLISH of the Book "Pervyy Gruppovoy Kosmicheskiy Polet" Moscow, Nauka Publishing House 1964 p 1–156
(JPRS-25272; TT-64-31567) OTS: $3.00

CONTENTS:

1. STUDIES OF THE COSMONAUTS IN THE PREFLIGHT PERIOD p 5–52 (See N64-25164 17-14)
2. CHARACTERISTICS OF FLIGHT CONDITIONS AND OF FLIGHT ASSIGNMENT p 53–70 (See N64-25165 17-14)
3. METHODS OF PHYSIOLOGICAL INVESTIGATION AND MEDICAL CONTROL DURING SPACE FLIGHT p 71–78 (See N64-25166 17-14)
4. RESULTS OF FLIGHT INVESTIGATIONS p 79–109 (See N64-25167 17-14)
5. POST-FLIGHT EXAMINATION p 110–161 (See N64-25168 17-14)

N64-25164 Joint Publications Research Service, Washington, D.C.

STUDIES OF THE COSMONAUTS IN THE PREFLIGHT PERIOD

In its First Group Flight into Outer Space: 11–15 Aug. 29 Jun. 1964 p 5–52 (See N64-25163 17-14) OTS: $3.00

The training of A. G. Nikolayev and P. R. Popovich for the first group space flight is discussed. The report considers this preflight period in two stages—first, increasing their body resistance to spaceflight effects, and second, giving them the background needed for scientific analysis of flight results. G.D.B.

N64-25165 Joint Publications Research Service, Washington, D.C.

CHARACTERISTICS OF FLIGHT CONDITIONS AND OF FLIGHT ASSIGNMENT

In its First Group Flight into Outer Space: 11–15 Aug. 1962 29 Jun. 1964 (See N64-25163 17-14) OTS: $3.00

This is a description of the twin space flight of Nikolayev and Popovich in Vostoks III and IV. Given are their flight assignments, conditioning of the gaseous environment, nutrition and water supply, and radiation environment. G.D.B.

N64-25166 Joint Publications Research Service, Washington, D.C.

METHODS OF PHYSIOLOGICAL INVESTIGATION AND MEDICAL CONTROL DURING THE SPACE FLIGHT

In its First Group Flight into Outer Space: 11–15 Aug. 1962 (See N64-25163 17-14) OTS: $3.00

Biotelemetric measurements during the Nikolayev–Popovich flights were conducted for research as well as for medical control of the condition of the cosmonauts. Recorded were an electrocardiogram at a single lead (thoracic bipolar), electroencephalogram at a single lead (biopolarly at the forehead–occiput region), pneumogram, electro-oculogram, electrical resistance of the skin, and signal transmission of pulse rate. G.D.B.

N64-25167 Joint Publications Research Service, Washington, D.C.

RESULTS OF FLIGHT INVESTIGATIONS

In its First Group Flight into Outer Space: 11–15 Aug. 1962 (See N64-25163 17-14) OTS: $3.00

The findings were systematized through processing and analysis in accordance with specific flight stages–prelaunch, launch into orbit, orbital, passage through the dense layers of the atmosphere, and descent. Since the conditions of both flights were identical and since the monotypical direction of changes in the main physiological reactions was identical for each astronaut, the results of processing and analyzing information obtained during the Nikolayev–Popovich flights are presented together. G.D.B.

N64-25168 Joint Publications Research Service, Washington, D.C.

POST FLIGHT EXAMINATION

In its First Group Flight into Outer Space: 11–15 Aug. 1962 29 Jun. 1964 p 110–161 (See N64-25163 17-14) OTS: $3.00

Extensive and immediate medical examinations were made of the cosmonauts Nikolayev and Popovich after their landing. The program included cardiovascular and respiratory systems, the osteosupport apparatus, neurological examination, vestibular tests, and others. Psychological effects were also noted. Their conditions were essentially unchanged. G.D.B.

N64-25172 Martin Co., Baltimore, Md.

CONTROL SYSTEM LAGS AND MAN-MACHINE SYSTEM PERFORMANCE

F. A. Muckler and R. W. Obermayer Washington, NASA, Jul. 1964 35 p refs
(Contract NASw-718)
(NASA-CR-83) OTS: $1.00

This review examines the manual control system literature on the effects of system lags to clarify major conceptual, analytic, and terminological problems. Four control system lags are defined—transmission, exponential, sigmoid, and oscillatory transient delays. The effects of lags on human performance are illustrated through studies of single control lag variables. However, since the interaction of task variables markedly influences tracking performance levels, an analysis of the control lag literature is conducted across the following task variables—system inputs, information sources, operator controls, controlled element, and environmental variables. Additionally, the relation between control lags and the procedural variable of transfer of training is discussed. Author

N64-25196 Joint Publications Research Service, Washington, D.C.
GROWTH-RELATED CHANGES IN THE ZINC CONTENT OF HUMAN BLOOD
T. L. Dubina 7 Jul. 1964 9 p refs Transl. into ENGLISH from Vestsi Akad. Navuk BSSR, Ser. Biol. Navuk (Minsk), no. 1, 1964 p 87-89
(JPRS-25364; TT-64-31637) OTS: $0.50

To ascertain the laws of growth-related changes in the zinc level in whole blood, the blood of 653 healthy children and adolescents, ages 7 to 18, was tested. The results of the analysis are presented and discussed. G.D.B.

N64-25198 Joint Publications Research Service, Washington, D.C.
DETERMINATION OF CERTAIN TRACE ELEMENTS IN RADIATION DERMATITES
A. Ya. Prokopchuk, A. T. Sosnovskiy, M. Z. Yagovdik, and Z. I. Orlova 17 Jul. 1964 15 p refs Transl. into ENGLISH from Vestsi Akad. Navuk BSSR Ser. Biol. Navuk, (Minsk), no. 1, 1964 p 92-96
(JPRS-25502; TT-64-31774) OTS: $0.50

The study of the amount of cobalt, nickel, copper, and zinc in the blood and in affected, scarry-changed skin under limited experimental radiodermatitis of rabbits is presented. Also studied is the amount of these trace elements in the blood of patients diseased with radiodermatitis. The amount of cobalt and zinc in the blood and affected skin of the rabbits has a tendency to increase. The amount of nickel in the blood does not appreciably change, but in the affected skin there is noted a tendency to increase. At the height of the development of radiation dermatitis there is an increase of the concentration of copper in the blood and in the affected skin. There is noted an increase of the amount of cobalt, nickel, and copper in the blood of patients ill with radiodermatitis. N.E.A.

N64-25204 California U., Berkeley Lawrence Radiation Lab.
BRAIN SEROTONIN AND BEHAVIOR IN SELECTED STRAINS OF RATS
Gordon T. Pryor Jan. 1964 289 p refs
(Contract W-7405-ENG-48)
(UCRL-11179) OTS: $3.50

This study of brain serotonin and behavior in selected strains of rats attacks the problem by discussing brain biochemistry and behavior; the role of serotinin; strain differences in noncholinergic systems; within-strain correlations between brain morphology, biochemistry, and behavior; and the effects of an enriched versus an impoverished environment on brain serotonin. G.D.B.

N64-25205 Argonne National Lab., Ill. Metallurgy Div.
DOSIMETRY FOR RADIATION DAMAGE STUDIES
A. D. Rossin Mar. 1964 21 p refs
(Contract W-31-109-ENG-38)
(ANL-6826) OTS: $0.50

A method is presented for reporting fast-neutron exposure in a meaningful and unambiguous fashion. The steps involve determination of spectrum shape, absolute magnitude, an energy weighting for the neutrons, and a unit for reporting exposure. Various methods for performing the procedure are described, and the reasoning behind the approach is explained. Author

N64-25206 National Aeronautics and Space Administration, Washington, D.C.
DYNAMOCARDIOGRAPHY
Ye. B. Babskiy and V. L. Karpman Jul. 1964 144 p refs Transl. into ENGLISH of the book "Dinamokardiografiya" Moscow, State Publishing House for Med. Lit., 1963
(NASA-TT-F-205) OTS: $2.75

The theoretical principles of a new method of investigating cardiac activity and some practical results are presented in this book. Dynamocardiography operates on the moment-of-force analysis of mechanical processes associated with cardiac contraction and measurements of the resultant displacement of the center of gravity of the thorax with respect to a plane support on which the patient lies. These physical processes produce complex curves having seven characteristic intervals that reveal certain manifestations of cardiac kinematics and thoracic hemodynamics. The changes in the curves indicate diagnostic data for mitral stenosis, adhesive pericarditis, and atherosclerotic cardiosclerosis. Further applications are: (1) the quantitative, objective evaluation of the functional state of the heart and the extent of thoracic circulation disruption and (2) the evaluation of the effectiveness of medical and surgical treatment in normalizing heart action. Author

N64-25235 Stanford Research Inst., Menlo Park, Calif.
LINEAR SEPARABILITY OF SIGNAL SPACE AS A BASIS FOR ADAPTIVE MECHANISMS Final Report
N. J. Nilsson Griffiss AFB, N.Y., RADC, May 1964 78 p refs
(Contract AF 30(602)-2943)
(RADC-TDR-64-145; AD-601849)

In this report it is suggested that the problem of the selection of discriminant functions constitutes the primary problem in the design of pattern classifying machines. Several classes of discriminant functions and some means of implementing them are discussed. Also, training methods for the selection of discriminant functions are presented. The new and existing material on trainable pattern classification machines was organized around the framework provided by the notion of discriminant functions to provide a basis for further theoretical development. Some specific new results were added to the theory of trainable pattern classifying machines. These are the capacity and generalization capabilities of the threshold logic units; Φ-functions and their use as discriminant functions; the comparison of the (1,0) versus the (1,−1) mode for pattern presentation; the boundedness of the length of the threshold logic unit weight vector during training; majority logic and committee machines; and feature detection. The geometrical construction of a majority rule solution committee and a majority solution committee for the parity function are presented. I.v.L.

N64-25296 Stanford Research Inst., Menlo Park, Calif.
A SIMPLE MODEL OF A PATTERN RECOGNITION SYSTEM
D. J. Hall Apr. 1964 28 p
(Contract DA-36-039-AMC-03247(E))
(TN-1; AD-600079)

A simple pattern-recognition model is presented, based upon principles similar to those used for the learning machine MINOS II, which is now operational. The model demonstrates

the ability to recognize imperfect versions of S, R, and I, (which may be drawn free-hand and may vary to a certain extent in size and position), thus displaying the basic properties of discrimination and generalization. The method used to select 10 "efficient" masks from a larger set of proposed masks is realistic in terms of computing time and can be used as a basis for understanding mask design for MINOS II. I.v.L.

N64-25308 Texas A&M Research Foundation, College Station Radiation Biology Lab.
CHRONIC WHOLE-BODY GAMMA RADIATION STRESS IN THE ALBINO RAT AND MOUSE Progress Report, Mar. 1963–Jun. 1964
Sidney O. Brown Apr 1964 99 p refs
(Sponsored by Army)
(AD-600960)

CONTENTS:

1. IRRADIATION AND THE HEMATOLOGY OF THE ALBINO RAT: HEMATOPOIETIC RECOVERY FOLLOWING CONTINUOUS AND FRACTIONATED RADIATION George M. Krise, Gertrude M. Adam, R. L. Lawson, and H. B. Pace p 1–4 refs (See N64-25309 18-16)
2. IRRADIATION AND THE HEMATOLOGY OF THE ALBINO RAT: EFFECTS OF CONTINUOUS AND FRACTIONATED CHRONIC RADIATION AT DOSE RATES OF 5 AND 10 r PER DAY George M. Krise, Gertrude M. Adam, and Geraldine Mc Ginty p 5–7 refs (See N64-25310 18-16)
3. THE EFFECT OF CONTINUOUS AND FRACTIONATED LOW INTENSITY GAMMA RADIATION IN RESISTANCE TO COLD STRESS IN THE ALBINO RAT—A PROGRESS REPORT Rommon L. Lawson, Sidney O. Brown, and George M. Krise p 8–12 refs (See N64-25311 18-16)
4. EFFECT OF CONTINUOUS OR FRACTIONATED LOW INTENSITY GAMMA RADIATION ON RESISTANCE TO HEAT STRESS IN THE ALBINO RAT E. W. Hupp, S. U. Ahmed, H. B. Pace, and Sidney O. Brown p 13–20 refs (See N64-25312 18-16)
5. EFFECTS OF CONTINUOUS IRRADIATION ON MAMMALS—A PRELIMINARY COMPILATION OF THE LITERATURE—DECEMBER 1963 J. W. Austin and E. W. Hupp p 21–53 refs (See N64-25313 18-16)
6. EFFECTS OF VARIOUS LEVELS OF ACUTE AND CHRONIC RADIATION ON SPERM VOLUME, TOTAL SPERM COUNT, PERCENT MOTILITY, PERCENT LIVE AND NORMAL SPERM, AND PERCENT ABNORMAL SPERM Rommon L. Lawson and Sidney O. Brown p 54–62 refs (See N64-25314 18-16)

N64-25309 Texas A&M Research Foundation, College Station
IRRADIATION AND THE HEMATOLOGY OF THE ALBINO RAT: HEMATOPOIETIC RECOVERY FOLLOWING CONTINUOUS AND FRACTIONED RADIATION
George M. Krise, Gertrude M. Adam, R. L. Lawson, and H. B. Pace *In its* Chronic Whole-Body Gamma Radiation Stress in the Albino Rat and Mouse, Apr. 1964 p 1–4 (See N64-25308 18-16)

This is a study of the recovery of the hematopoietic system following exposure of the whole animal to continuous and macrofractionated doses of gamma irradiation. A total of 100 mature male albino rats were selected and divided into five radiation-exposure groups. Upon completion of the irradiation schedule, blood samples were analyzed. The damage to the specimens resulting from the experiments is discussed. G.D.B.

N64-25310 Texas A&M Research Foundation, College Station
IRRADIATION AND THE HEMATOLOGY OF THE ALBINO RAT: EFFECTS OF CONTINUOUS AND FRACTIONATED CHRONIC RADIATION AT DOSE RATES OF 5 AND 10 r PER DAY
George M. Krise, Gertrude M. Adam, and Geraldine Mc Ginty *In its* Chronic Whole-Body Gamma Radiation Stress in the Albino Rat and Mouse, Apr. 1964 p 5–7 (See N64-25308 18-16)

The absence of a cyclic response in weight of albino rats or in WBCC in the case of the weekly fractionated doses of 5 r or 10 r per day as seen in higher dose schedules seems to indicate that insufficient damage occurred during the irradiation periods to elicit a marked hyperplastic response of the hematopoietic system or of the animal as a whole. Perhaps, if irradiation is to be considered as a nonspecific stressor, the stress presented by these dose levels is insufficient to bring about an alarm reaction and the subsequent period of adaptation that might be used to explain the cyclic nature exhibited at higher dose rates. G.D.B.

N64-25311 Texas A&M Research Foundation, College Station
THE EFFECT OF CONTINUOUS AND FRACTIONATED LOW INTENSITY GAMMA RADIATION IN RESISTANCE TO COLD STRESS IN THE ALBINO RAT Progress Report
Rommon L. Lawson, Sidney O. Brown, and George M. Krise *In its* Chronic Whole-Body Gamma Radiation Stress in the Albino Rat and Mouse, Apr. 1964 p 8–12 refs (See N64-25308 18-16)

The plan of this study was to investigate the effects of continuous and fractionated low-intensity radiation on the ability of the albino rat to withstand environmental thermal stresses. This first phase of the program is designed to study the effect of the radiation regimen when it is applied previous to the cold stress; the temperature used was 5° C with 82% humidity. Methods, procedures, and results—body weight, cold injury, etc.—are given. G.D.B.

N64-25312 Texas A&M Research Foundation, College Station
EFFECT OF CONTINUOUS OR FRACTIONATED LOW INTENSITY GAMMA RADIATION ON RESISTANCE TO HEAT STRESS IN THE ALBINO RAT
E. W. Hupp, S. U. Ahmed, H. B. Pace, and S. O. Brown *In its* Chronic Whole-Body Gamma Radiation Stress in the Albino Rat and Mouse, Apr. 1964 p 13–20 refs (See N64-25308 18-16)

The purpose of this investigation was to study the effect of continuous and weekly fractionated doses of gamma radiation administered in daily doses of 20 r to a total accumulated dose of 1,000 r on the resistance of the albino rat to heat stress. The environmental heat stress produced by a temperature of 93° F and 90% RH was applied immediately after the completion of the radiation regime. The clinical appearance of the animal, body weight changes, rectal temperature, gross and histopathologic appearance of organs, and survival were the chief criteria of radiation damage. G.D.B.

N64-25313 Texas A&M Research Foundation, College Station
EFFECTS OF CONTINUOUS IRRADIATION ON MAMMALS—A PRELIMINARY COMPILATION OF THE LITERATURE—DECEMBER 1963
J. W. Austin and E. W. Hupp *In its* Chronic Whole-Body Gamma Radiation Stress in the Albino Rat and Mouse, Apr. 1964 p 21–53 refs (See N64-25308 18-16)

Literature is cited, quoted, and discussed in an effort to clarify the effects of continuous irradiation on mammals. An alphabetic bibliography is included in this paper. G.D.B.

N64-25314 Texas A&M Research Foundation, College Station

EFFECTS OF VARIOUS LEVELS OF ACUTE AND CHRONIC RADIATION ON SPERM VOLUME, TOTAL SPERM COUNT, PER CENT MOTILITY, PER CENT LIVE AND NORMAL SPERM, AND PER CENT ABNORMAL SPERM

Rommon L. Lawson and Sidney O. Brown *In its* Chronic Whole-Body Gamma Radiation Stress in the Albino Rat and Mouse, Apr. 1964 p 54–62 (See N64-25308 18-16)

The purpose of this investigation was to observe the effect of continuous and fractionated radiation doses on sperm activity. The sperm reflect the radiation damage to the testes since they are the end product of testicular proliferation. Sperm in the human are easily obtained and may be used as an indicator of radiation injury in much the same way as the lymphocytes. The effect of whole-body radiation on fertility of male rats was examined by systematic weekly matings of treated males. G.D.B.

N64-25323 Army Research Office, Washington, D.C. Life Sciences Div.

A STUDY OF THE MILITARY APPLICABILITY OF RESEARCH ON ASCORBIC ACID

Wendell H. Griffith 12 Aug. 1963 55 p refs
(Contract DA-49-092-ARO-9)
(AD-429526)

Current research on ascorbic acid that is applicable to military needs is discussed. The military importance of these studies is indicated by the fact that the formation of connective tissue is indispensable for wound healing and that research on the biogenesis of collagen of connective tissue is, in fact, research on a basic aspect of the function and mechanism of action of ascorbic acid. The hydroxylation reaction, on which the synthesis of collagen's hydroxyproline depends, may be the metabolic reaction that underlies much of the vitamin's activity in the body. Author

N64-25331 Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.

BIODYNAMICS: PAST, PRESENT AND FUTURE

Ellis R. Taylor Mar. 1963 24 p refs
(ARL-TDR-63-10; AD-402084)

A brief operational definition of biodynamics is presented. Following a condensed history of the field, including a review of weaknesses of the transient mechanical analytic approach, present biological research activities are listed. A definition of working relationships between disciplines is advanced. Author

N64-25338 School of Aerospace Medicine, Brooks AFB, Tex.

MAXIMUM PRESSURE-VOLUME RELATIONSHIPS OF THE HUMAN RESPIRATORY SYSTEMS

Louis F. Johnson, Jr. May 1964 10 p refs
(SAM-TDR-64-21; AD-601601)

Maximum respiratory pressure-volume relationships were determined in five experienced male subjects by three methods: (1) by exerting pressures against a mercury U-tube manometer; (2) by exerting pressures against an occluded breathing tube with the subject sitting in a full-body plethysmograph; and (3) by maximally exhaling into and inhaling from a series of different-sized containers. Greater expiratory and inspiratory pressures could be exerted against infinite resistance (methods 1 and 2) than against variable resistance (method 3). Author

N64-25340 Chicago U., Ill.

INFLUENCE OF X-IRRADIATION ON DEVELOPMENT OF MICROSOME OXIDASE AND REDUCTASE ACTIVITY IN THE LIVERS OF YOUNG MALE RATS

Bernard E. Hietbrink and Kenneth P. Dubois Brooks AFB, Tex., School of Aerospace Med., Jun. 1964 10p refs
(Contract AF 41(609)-1693)
(SAM-TDR-64-29; AD-601792)

A study was conducted on the influence of X-ray on the development of an oxidase in liver microsomes that catalyzes the oxidative desulfuration of phosphorothioates. Exposure of 23-day-old male rats to 200 r or 400 r almost completely inhibited the development of phosphorothioate oxidase activity during the 3-week observation period following radiation. Substantial inhibition of the development of oxidase activity was also observed after exposure of the animals to 100 r. Marked inhibition of the development of the enzyme activity in regenerating livers of partially hepatectomized rats was observed following exposure to X-ray of 200 r to 600 r. The absence of an inhibitory effect by X-ray-irradiation on the phosphorothiote oxidizing activity of the livers of adult male rats suggests that the effect of X-ray is on some process involved in the synthesis of phosphorothioate oxidase. X-ray-irradiation had no effect on the development of reductase activity in the livers of young rats, indicating selectivity in the action of X-ray on the development of microsome enzymes. Author

N64-25355 Martin Co., Baltimore, Md.

TRAINING PLAN—SLOW MALFUNCTION MONITORS LV 305A

D. E. Farr 28 Feb. 1964 26 p refs

Ground monitors are needed to provide the capability of recognizing slowly developing malfunctions in order to increase the probability of mission success by permitting manual switchover to the secondary control system. This training plan includes the steps to be taken for the training and evaluation of ground monitor-observer personnel. The training events are programed to prepare three persons in the recognition and diagnosis of slow malfunction problems. Candidate selection is included since it is necessary for monitor candidates to have considerable background knowledge and experience. The monitor's primary task is real-time monitoring of the flight performance of the guidance, primary, and secondary control systems, and the operation of the various airborne discretes. The responsibility includes crew safety and a continuous appraisal of mission success in terms of constraint violations and one and one-half orbit capability. Task analysis methodology and a sample work sheet are included in this plan as an indication of the scope of interest in providing training and evaluation data. I.v.L.

N64-25383 Stanford U., Calif.

THE DISTRIBUTION OF BLOOD FLOW IN HUMAN SKIN Annual Progress Report, Jul. 1, 1962–Jun. 30, 1963

J. M. Crismon [1963] 6 p refs
(Contract DA-49-193-MD-2311)
(AD-411171)

A new method of measuring and recording volume increase for the measurement of forearm blood flow by venous occlusion plethysmography is reported. The radiofrequency capacitance bridge method was used to avoid temperature change inaccuracies. Also, the role of diffusion in skin circulation was examined with a mathematical model and by the clearance method, using ^{131}I in anesthetized rats. The slow clearance rate, it was concluded, does not clearly reflect the circulation rate. D.E.W.

N64-25455 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

SOME RESULTS OF THE STUDY OF THE BIOLOGICAL EFFECT OF NEUTRONS AND PROTONS

27 Apr. 1964 23 p refs Transl. into ENGLISH from the Publ. Nekotoryye Itogi Izuch. Biol. Deystviya Neytronov i Protonov (USSR), 1963 19 p
(FTD-TT-63-1046/1+4; AD-600785)

A survey was made of the current technology of determining the relative biological effectiveness (RBE) of neutron and protons. Experiments are cited and an evaluation, which includes the following, is made. (1) More work on explaining the qualitative properties of the neutron biological effect is exceptionally important both on a general radiobiological plane and to solve the practical questions of radiation safety. (2) More research is needed on the characteristics of the biological effect of protons. (3) The judgment of the RBE by mortality and acute demonstration of radiation damage can lead to erroneous conclusions. Evidently, the RBE of different types of ionizing radiation should be evaluated only from the total reaction of the whole organism, in which the adaptating and compensating mechanisms conceal, for a long time, the damage arising in separate systems. I.v.L.

N64-25458 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
SOME PROBLEMS OF RECORDING HEART SOUNDS
A. I. Koblents-Midshke 23 Mar. 1964 15 p refs Transl. into ENGLISH from Elektron. V Med. (Moscow), 1960 p 110–119
(FTD-TT-63-1193/1+2+4; AD-436840)

Phonocardiography requires the development of a recorder with a directly readable recording, calculated on a frequency transmission up to 800 cps. Selection of a standard system of frequency characteristics of the apparatus is recommended. Standardizing the conditions of conducting sounds to the sensing element of the microphone, or neutralizing the changes of these conditions, is desirable. Development of apparatus that represents sound pressure not only in a linear but also in a logarithmic scale is suggested. G.D.B.

N64-25462 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
TOXICITY OF CERTAIN ISOALCOHOLS, HIGHER ALCOHOLS, AND MELAMINE-FORMALDEHYDE RESINS
K. P. Stasenkova and R. N. Mel'nikova 28 Apr. 1964 7 p refs Transl. into ENGLISH from Toksikol. Novykh Prom. Khim. Veshchestv (USSR), no. 3, 1961 p 108–112
(FTD-TT-64-97/1+4; AD-600812)

Investigations were conducted of the toxicity of isoalcohols with boiling ranges of 112° to 148° C and 138° to 175° C, higher alcohols with boiling ranges of 165° to 225° C, and three forms of melamine–formaldehyde resins prepared from the above alcohols. Results include the following: (1) The clinical picture of severe intoxication in white mice, white rats, and rabbits, through breathing the fumes of the chemicals, was characterized by symptoms of narcotic and irritating actions. No animals died. (2) Intragastrical injections of 10 g/kg of all alcohols killed 100% of the test specimens (white mice and white rats). Autopsies revealed acute hyperemia of the mucous membrane of the stomach and small intestines, and sometimes there was hemorrhaging in these organs. A 5 g/kg dose caused 60% death when isoalcohols with a boiling range of 112° to 148° C were injected. The remaining alcohols were not lethal in this dose. A 5 g/kg injection of the melamine–formaldehyde resins produced from these alcohols did not cause death; however, symptoms of intoxication appeared. (3) One short application of the alcohols and resins on the skin of rabbits caused hyperemia, fine punctate intradermal extravasation, subsequent scabbing, shallow fissures, dryness, and desquamation of the skin. Complete recovery came after two weeks. I.v.L.

N64-25472 Massachusetts Inst. of Tech., Cambridge
FAST NEUTRON SPECTROSCOPY AND DOSIMETRY OF THE MIT REACTOR MEDICAL THERAPY FACILITY BEAM Scientific Report No. 3
Roger A. Rydin, Norman C. Rasmussen, and Gordon L. Brownell (Ph.D Thesis) May 1964 254 p refs
(Contract AF 19(604)-7492)
(MITNE-47; AFCRL-64-404; AD-602057)

The neutron spectrum was measured using a combination of foil detectors. The foil activation data were obtained by gamma-ray spectrum analysis and decay curve analysis. Decay curves for Al^{28} and Mg^{27} were analyzed using FRANTIC, an iterative, weighted, least-squares exponential growth and decay data fitting program. FRANTIC was also used to fit gross fission product decay curves from Np^{237}, U^{238}, Th^{232}, and U^{235}. The fast neutron spectrum was calculated from the threshold foil data using the Weighted Orthonormal and Weighted Orthonormal Polynomial Methods, which were coded for the IBM 7090 computer. A composite neutron spectrum was constructed using the results of the fast, epithermal, and thermal flux measurements. This was used to compute the dose rate in tissue using Snyder's Monte Carlo results for a broad beam of neutrons. The calculated gamma-ray dose was then compared to experimental results. Author

N64-25491 Brandeis U., Waltham, Mass.
ANTIBODIES TO HUMAN A_1 HEMOGLOBIN AND THEIR REACTION WITH A_2, *S*, *C*, AND *H* HEMOGLOBINS
Morris Reichlin, Malgorzata Hay, and Lawrence Levine Repr. from Immunochem., v. 1, 1964 p 21–30 refs
(Grants NsG-375; C-221; NIH E-1940)

Antibodies with specificity toward A_1 human hemoglobin have been produced in rabbits. The antisera were identified as antihemoglobin by use of agar diffusion and immunoelectrophoresis, the demonstration of the dependence of complete serologic reactivity on the presence of hematin, and the quantitative recovery of hematin in the immune precipitate. The anti-A_1 sera distinguish the mutant hemoglobins *S* and *C* from A_1 by microcomplement fixation but not by quantitative precipitation. The antigenic difference in the abnormal hemoglobins is probably a result of a change in conformation at the *N*-terminus of the β chain. The quantitative reaction of human hemoglobin A_2 and *H* was also studied. A_2 hemoglobin was less effective serologically than *S* or *C*. Hemoglobin *H* reacted with anti-A_1 as measured by inhibition of A_1-anti-A_1. Variable amounts of antibodies directed toward the β chain were found in the three antisera. Author

N64-25511 Lockheed Missiles and Space Co., Sunnyvale, Calif.
RADIATION EFFECTS UPON EXPERIMENTAL ANIMALS, MAN, AND PLANTS: AN ANNOTATED BIBLIOGRAPHY, VOL. II, M-Z
Jack B. Goldmann, comp. Jan. 1963 440 p refs For Vol. I see N64-20517 13-16
(SB-62-60, vol. II; Rept.-5-10-62-54, vol. II; AD-438178)

This is an annotated bibliography of publications relating to radiation effects on living matter, arranged alphabetically by author. An author index is included. G.D.B.

N64-25512 Miami U., Coral Gables, Fla. Bascom Palmer Eye Inst.
HUMAN ELECTRORETINOGRAPHY AS A GAUGE OF VISUAL PERFORMANCE First Annual Progress Report, Sep. 1, 1962–Jun. 1, 1963
Thorne Shipley [1963] 22 p
(Contract DA-49-193-MD-2344)
(AD-602526)

This report covers 191 human electroretinograms taken in the ERG laboratories, with reference to doubling of *a* and *b* components; correlation with dark—adaptation; general inhibitory effects; general systemic ERG inhibition and enhancement; binocular interaction effects; and ERG in relation to maturation. It also covers supportive animal studies. Author

N64-25572 Spacelabs, Inc., Van Nuys, Calif.
DEVELOPMENT OF AN IMPEDANCE PNEUMOGRAPH Final Report
Joseph R. Smith, Jr. 28 May 1964 37 p refs
(Contract NAS2-1097)
(NASA-CR-56834; SR-64-1006) OTS: $3.60 ph

A research and development program directed toward the design and fabrication of an improved impedance pneumograph was carried out. The relationship between impedance measurement and volumetric changes during breathing was examined. A series of tests were conducted to provide information regarding the effects of electrode placement, electrode design, and body movement on the various components of the impedance change. This study aided the design of a new impedance pneumograph signal conditioner. G.D.B.

N64-25608 Massachusetts Inst. of Tech., Cambridge Research Lab. of Electronics
COMPARISON OF GRAMMAR OF CHILDREN WITH FUNCTIONALLY DEVIANT AND NORMAL SPEECH
Paula Menyuk Repr. from J. Speech and Hearing Res., v. 7, no. 2, Jun. 1964 p 109–121 refs
(Grants NsG-496; NSF-G-16526; MH-04737-03)

A generative model of grammar was used to compare the grammar of 10 children diagnosed as using infantile speech with that of 10 matched children using normal speech to attempt to formalize the description of language simply characterized as infantile. The language of one child was periodically sampled from age two to three. A language sample from each child was analyzed, and the syntactic structures used were postulated. A number of children in each group were asked to repeat a list of sentences containing syntactic structures found in children's grammar. The term infantile seemed to be a misnomer, since at no age level did the grammatical production of a child with deviant speech match or closely match that of a child with normal speech. It was hypothesized that the differences found in the use and repetition of syntactic structures between the two groups might be due to differences in the use of the coding processes for the perception and production of language. The children with deviant speech, in the terms of the model of grammar used for analysis, formulated their sentences with the most general rules, whereas children with normal speech used increasingly differentiating rules for different structures as they matured. Author

N64-25655 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
TECHNICAL PROCEDURES FOR DETECTING WEAK BIOELECTRICAL RESPONSES
V. A. Kozhevnikov 24 Mar. 1964 14 p refs Transl. into ENGLISH from Elektron. V Med. (Moscow-Leningrad), 1960 p 120–129
(FTD-TT-63-1194/1+2+4; AD-438783)

The recording of biological responses is discussed. A device has been developed that increases the sweep time to 100 sec. Beam intensity modulation rides a carrier frequency (100 cps) that permits the recording of slow changes and the d.c. component of the signal. For cases of nonrhythmic application of stimulation, a device is used in which the stepwise displacement of the traces is accomplished by means of an electromechanical relay system. Delay of the moment of stimulation, from the start of the trace, and the length of this delay are provided by a phantastron circuit. With nonrhythmic application of stimulation, it is possible to record up to 100 traces on a single frame, and as many as 400 or more when the stimulations are rhythmic. It is possible to record, in the form of a three-dimensional chart, the results of a repeated observation of an electrogram on a single frame. It is necessary to determine the average value of the voltage as a function of the time computed from the moment of stimulation application, on the basis of the accumulated measurements, in order to distinguish the components of the electrogram (i.e., the responses) associated with the applied stimuli. This determination is made by photometry of the obtained picture. Signals lying 20 db below the normal detection level can be clearly detected. I.v.L.

N64-25767 Baylor U., Houston, Tex. Coll. of Medicine
DEVELOPMENT OF AN ELECTRODE FOR LONG TERM APPLICATION IN BIOLOGICAL RECORDING Final Report
Robert Edelberg (Houston State Psychiat. Inst.) Oct. 1963 94 p refs
(Contract NAS9-445)
(NASA-CR-56205) OTS: $8.60 ph

The feasibility of converting various materials including cellulose, leather, and human skin from a nonconductor to a good conductor by infiltration with silver salt and subsequent reduction was demonstrated. A method suitable for use on humans was developed and produced skin resistances of the same order as those measured on a conventional wet electrolytic site. A skin solder consisting of a suspension of conducting particles in a polyvinylpyrrolidone matrix was developed. The deterioration of the high conductivity of silver-infiltrated human skin was due to a progressive oxidative process rather than to mechanical disruption of the conducting lattice, and various protective measures were effective in reducing this deterioration. G.D.B.

N64-25768 California U., Berkeley
EXPERIMENTAL RESEARCH ON HEMODYNAMIC AND METABOLIC FUNCTIONS IN PRIMATES Semi-Annual Status Report, 1 Aug. 1963–31 Jan. 1964
Nello Pace et al [1964] 14 p
(Grant NsG-170-61)
(NASA-CR-56348; Rept.-4) OTS: $1.60 ph

The current program status includes the following: (1) Two new general procedures, one for long-term restraint and the other for chronic vascular catheter implantation, have been developed. (2) Analytical chemical procedures for the following urinary constituents are presently in operation: total osmotic activity, sodium, potassium, calcium, magnesium, ammonia, chloride, phosphate, sulfate, urea, uric acid, creatinine, glucose, 5-hydroxyindoleacetic acid, 17-ketosteroids, 17-hydroxycorticosteroids, epinephrine, norepinephrine, and dopamine. (3) A procedure for in vivo measurement of total body water content, by means of tritium-labeled water, is now operational. (4) New physiological baseline data obtained on the pigtailed monkey are summarized. These data pertain to reproduction and growth, hematology, hemodynamics, and body temperature. I.v.L.

N64-25823 Rocketdyne, Canoga Park, Calif.
ENGINEERING SAFETY INTO MISSILE-SPACE SYSTEMS
Rex B. Gordon [1964] 23 p refs Presented at the SAE-ASME-AIAA Aerospace Reliability and Maintainability Conf., Washington, 29 Jun.–1 Jul. 1964

Safety engineering, as applied to complex missile and space systems, has developed a new methodology referred to as system safety engineering. The requirement for a comprehensive approach to safety that is included as a contractually covered adjunct to the design, development, and operational phases of a systems life cycle has become apparent

from costly missile mishap experience. The general concepts and accomplishments of this new engineering discipline are described along with possible beneficial relationships with reliability and other recognized organizational elements engaged in safety related activities. Author

N64-25828 Royal Air Force, Farnborough (Gt. Brit.) Inst. of Aviation Medicine

MEASURING PILOT PERFORMANCE AND CONTROL IN A FLIGHT TASK SIMULATOR

H. F. Huddleston and A. W. Napier Mar. 1964 14 p refs (IAM-TM-226)

A method of measuring control activity is described. A test pilot, a pilot, and a nonpilot were required to execute a standard run in a fixed-base flight task simulator. Traditional performance measures of error demonstrated that the test pilot achieved best accuracy, while the pilot and nonpilot produced remarkably similar satisfactory performance. One possible index of control workload and strategy demonstrated that the three individuals achieved the observed accuracy by quite dissimilar means. In particular, the nonpilot worked far harder than the pilot to achieve much the same result. Author

IAA ENTRIES

A64-20093
TOLERANCE TO VEHICLE ROTATION OF SUBJECTS USING TURNING AND NODDING MOTION OF THE HEAD WHILE PERFORMING SIMPLE TASKS.
Ralph W. Stone, Jr. and William Letko (NASA, Langley Research Center, Space Mechanics Div., Hampton, Va.).
American Institute of Aeronautics and Astronautics, Annual Meeting, 1st, Washington, D.C., June 29-July 2, 1964, Paper 64-218. 12 p. 6 refs.
Members, $0.50; nonmembers, $1.00.

Study of the physiological effects accompanying various head motions made in a rotating environment, such as that which may be used in a space vehicle in order to obtain artificial gravity. When nodding or turning motions of the head are made in a rotating environment, cross-coupled angular accelerations result which are sensed by the semicircular canals, which, although nearly orthogonal to one another, are not aligned with the body's axis. Tolerance studies are made on subjects oriented with their long-body axis perpendicular to the axis of rotation, as in an artificial-gravity system. These studies indicate a greater sensitivity to accelerations sensed by the lateral semicircular canals than to those sensed by the vertical (anterior and posterior) canals. Adaptation to rotation would, therefore, become more readily obtainable if the head could be moved so as not to stimulate the lateral semicircular canals.

A64-20103
VISUAL CAPABILITIES AND LIMITATIONS APPLIED TO DOCKING MANEUVERS IN SPATIAL ENVIRONMENT.
Charles J. Varanay (North American Aviation, Inc., Space and Information Systems Div., Downey, Calif.).
American Institute of Aeronautics and Astronautics, Annual Meeting, 1st, Washington, D.C., June 29-July 2, 1964, Paper 64-221. 8 p. 13 refs.
Members, $0.50; nonmembers, $1.00.

Analysis of the visual problems involved in the docking of space vehicles. Limitations of the astronaut's visual capabilities and restraints due to light on the target and orientation of the vehicle configurations are discussed. Biological and experimental results concerning the judgement, guidance, and control capabilities of an astronaut are reviewed, as are methods for determining minimum target luminances and the optimum vehicle orientation for docking. As an example, the procedures outlined are applied to the problem of docking two vehicles in the shadow of the Moon during a lunar orbit mission.

A64-20127
THE PILOT'S ROLE DURING MERCURY SYSTEMS FAILURES.
John H. Boynton (NASA, Manned Spacecraft Center, Houston, Tex.).
American Institute of Aeronautics and Astronautics, Annual Meeting, 1st, Washington, D.C., June 29-July 2, 1964, Paper 64-222. 12 p. 12 refs.
Members, $0.50; nonmembers, $1.00.

Analysis of critical system-failures which occurred during the Mercury manned orbital flights, with regard to pilot response and effectiveness in coping with the situations. The spacecraft systems in which malfunctions occurred are briefly described, including the attitude-control, sequential, life-support, and electrical systems. Malfunctions in unmanned orbital flights are briefly considered, with particular attention to the mission consequences if a pilot had been present to provide manual override. The system failures coped with by astronauts Glenn, Carpenter, Shirra, and Cooper are discussed. Their successful circumvention of these failures is noted as indicating the great value of their comprehensive preflight preparation.

A64-20231
HUMAN VIBRATION AND IMPACT PROTECTION BY AIRBAG RESTRAINT SYSTEMS.
Carl C. Clark and Carl Blechschmidt (Martin Marietta Corp., Martin Co., Life Sciences Dept., Baltimore, Md.).
American Institute of Aeronautics and Astronautics, Annual Meeting, 1st, Washington, D.C., June 29-July 2, 1964, Paper 64-220. 8 p. 22 refs.
Members, $0.50; nonmembers, $1.00.

Description of manned impact tests of airbag restraint systems in a preliminary experimentation box, a spacecraft simulator, and a passenger airplane simulator, to show the feasibility of such active elastic restraint systems, whose restoring forces can be varied by varying bag pressures to insure the prevention of "bottoming". It is stated that these systems can isolate from high frequency (above 5 cps) vibration and impact loads, transmitting less than 50% and often less than 25% of the loads on the "vehicle." Rebound effects occur at a low enough frequency (near 3 cps) to be physiologically acceptable, without any bag pressure dumping or valving. Manned impact tests up to impact velocities of 9.8 m/sec (32 ft/sec) have been carried out in the spacecraft simulator. For the 45° feet-down attitude, with a load of +72gx and +27gz on the vehicle (77g resultant), the load on the man's head was less than +16gx and 9gz, and on the chest and hip less than 9gx and 11gz. It is noted that manned impact tests in the passenger aircraft simulator involved -40gx on the vehicle, but only -10gx on the man's hip.

A64-20234
ACCIDENT PREVENTION.
David D. Thomas (Federal Aviation Agency, Washington, D.C.).
Society of Automotive Engineers and American Society of Mechanical Engineers, Air Transport and Space Meeting, New York, N. Y., Apr. 27-30, 1964, Paper 854D. 4 p.
Members, $0.75; nonmembers, $1.00.

Description of efforts made in carrying out FAA's statutory responsibilities in the field of accident prevention. The following FAA programs are briefly explained: (1) an air carrier maintenance system of establishing airworthiness alert values so that timely maintenance can be performed; (2) outline of a concentrated program to prevent false fire warnings; (3) development and expansion of positive control in Air Traffic Service; (4) flight checking of airline captains by special, trained inspectors; (5) participating in CAB-FAA schooling on accident investigation; and (6) dissemination of safety literature in the general aviation field.

A64-20257
LIFE SUPPORT - THE NEXT GENERATION.
Michael G. Del Duca, Eugene B. Konecci, and A. Layton Ingelfinger (NASA, Office of Advanced Research and Technology, Biotechnology and Human Research Div., Washington, D.C.).
Space/Aeronautics, vol. 41, June 1964, p. 84-91. 5 refs.

Discussion of life-support systems for space missions of long duration. An advanced life-support system can be broken down into three major subsystems: (1) an atmospheric control system to regulate the oxygen, carbon dioxide, and water partial pressures in suits, cabins, and other units, to keep odors and contaminants at acceptable levels, and to recover carbon dioxide and water from cabin air; (2) a food, water, and waste subsystem to provide food selection, preservation, and preparation for waste collection; and (3) a thermal control subsystem that regulates all heat fluxes and temperatures except the power source heat rejection. Various mechanisms for accomplishing these controls and processes are considered. It is felt that the subsystems that are available today could regenerate the necessary potable water and breathable air, but food regeneration is not yet feasible.

A64-20307
ASPECTS OF EXTRA-VEHICULAR MOBILITY OF A HUMAN OPERATOR IN SPACE.
R. J. Dutzmann (Chrysler Corp., Missile Div., Detroit, Mich.).
Society of Automotive Engineers and American Society of Mechanical Engineers, Air Transport and Space Meeting, New York, N. Y., Apr. 27-30, 1964, Paper 857H. 11 p. 6 refs.
Members, $0.75; nonmembers, $1.00.

Discussion of the general problems facing a human operator in space, with particular emphasis on mobility. An analysis of motions using a simple systems concept leads to discussion of operational aspects and determination of propellant requirements and results in a preliminary design specification of a mobility system. Finally, the first attempt at preliminary system design is presented. From this effort, it is concluded that a simple, free-space mobility system can be provided at low weight penalties, thus making it suitable for early experiments, possibly on Gemini.

A64-20346
THRESHOLD SIZE OF A MOVING OBJECT AS A FUNCTION OF ITS SPEED.
Balraj Bhatia (Madras Medical College, Defense Institute of Physiology and Allied Sciences, Madras, India) and C. A. Verghese (Air Force School of Aviation Medicine, Bangalore, India).
Optical Society of America, Journal, vol. 54, July 1964, p. 948-950.

Determination of the threshold size of an object as a function of its speed, with the eyes fixed using seven different speeds from 55 to 600 cm/sec. The relationship is found to be linear and is given by the equation $O=a+bV$, where O is the threshold size in mm, V is the speed in cm/sec and a and b are constants characteristic of the individual. It is suggested that the spatio-temporal pattern at the psychovisual cortex is in some way responsible for the observed function.

A64-20347
EFFECT OF LUMINANCE NOISE ON CONTRAST THRESHOLDS.
N. S. Nagaraja (Indian Institute of Science, Bangalore, India).
Optical Society of America, Journal, vol. 54, July 1964, p. 950-955. 8 refs.

Consideration of the effect on contrast thresholds of the fluctuations in the background luminance or "luminance noise." Targets of several sizes are produced on a television screen, imbedded in fine-grain luminance noise of controllable magnitude. The results are stated to indicate that luminance fluctuations of small magnitude do not affect the threshold very much when the mean luminance of the screen is 0.01 and 0.1 ft-L, while they do change it appreciably at 1.0 ft-L. When luminance fluctuations are large, contrast thresholds at the above three luminance levels are said to be nearly the same, indicating that the degree of luminance fluctuation governs the contrast threshold. The extent to which luminance noise increases the contrast threshold is used to estimate the internal noise of the vision channel, and an attempt is made to compare this with the noise that might be expected on account of fluctuations in the number of quanta absorbed in the retina.

A64-20358
CONSIDERATION OF CREW COMFORT IN RELATION TO THE DYNAMICS OF ROTATING SPACE STATIONS.
A. Cormack, III and C. C. Couchman (North American Aviation, Inc., Space and Information Systems Div., Downey, Calif.).
American Institute of Aeronautics and Astronautics, Annual Meeting, 1st, Washington, D.C., June 29-July 2, 1964, Paper 64-338. 8 p. Members, $0.50; nonmembers, $1.00.

Mathematical study of the physical effects produced by wobble, static and dynamic mass unbalance, docking impacts, and crew movements in a satellite provided with artificial gravity. The space-station configuration assumed is the hexagonal vehicle of NASA contract NAS1-1630. Human tolerance for unusual accelerations and the required stabilization and control techniques are discussed.

A64-20452
POST CRASH SURVIVAL CONSIDERATIONS.
Bernard C. Doyle and John J. Carroll (Civil Aeronautics Board, Washington, D.C.).
Society of Automotive Engineers and American Society of Mechanical Engineers, Air Transport and Space Meeting, New York, N.Y., Apr. 27-30, 1964, Paper 851D. 5 p.
Members, $0.75; nonmembers, $1.00.

Discussion of post-crash factors which effect survival. It is shown that two most dangerous hazards in an otherwise survivable accident are drowning and post-crash fire and that rapid evacuation of the aircraft is crucial. Provisions for such evacuation are described. Case histories of aircraft ditching and evacuation are presented and the attendant difficulties detailed.

A64-20469
BIOASTRONAUTICS - SLOGANS, SEMANTICS AND SCIENCE.
Bernard M. Wagner (New York Medical College, Dept. of Pathology, New York, N.Y.).
American Institute of Aeronautics and Astronautics, Annual Meeting, 1st, Washington, D.C., June 29-July 2, 1964, Paper 64-515. 4 p. Members, $0.50; nonmembers, $1.00.

Comparison of the American and Russian approach to manned spacecraft and space travel. Work in progress in American programs is briefly surveyed. Problems of life support and protection against the space environment are noted, especially the clinical aspect of zero g. The conclusion is reached that unless American bioastronautics effort is defined, unified, and directed, Russian supremacy in manned space exploration is assured.

A64-20483
MONITORING ARTERIAL EXTENSIBILITY - THE CONTINUOUS PULSE WAVE VELOCITY.
Gershon Weltman (California, University, Dept. of Engineering, Los Angeles, Calif.) and George H. Sullivan (Spacelabs, Inc., Van Nuys, Calif.).
American Institute of Aeronautics and Astronautics, Annual Meeting, 1st, Washington, D.C., June 29-July 2, 1964, Paper 64-216. 7 p. 31 refs.

Discussion of an approach to the continuous indirect measurement of arterial pressure using the pulse wave velocity (PWV). The determinants of arterial pressure are briefly considered. It is then pointed out that arterial pressure is the major factor influencing arterial extensibility. Early investigations showed that extensibility determines the propagation velocity of pulses along the arterial wall and that, therefore, extensibility can be estimated by measuring arterial PWV. The presented study investigates the relation between PWV and blood pressure. A patchwork laboratory setup is used for one, and a PWV computer constructed by Spacelabs, Inc., for the other experiment. The results, virtually the same for both methods, are presented. PWV records are obtained for a group of normal male subjects during supine relaxation and during the execution of a prolonged Valsalva maneuver. The directly measured blood pressure response pattern is found to resemble strikingly the response pattern of the PWV. Problem areas - such as questions of definitions, measurement technique, uncertainties of assumptions, etc. - are considered.

A64-20487
SPACE SUITS FOR NORMAL AND EMERGENCY SPACE VEHICLE OPERATION.
Ray E. Snyder (Douglas Aircraft Co., Inc., Missile and Space Systems Div., Advance Space Technology, Santa Monica, Calif.).
American Institute of Aeronautics and Astronautics, Annual Meeting, 1st, Washington, D.C., June 29-July 2, 1964, Paper 64-214. 8 p. Members, $0.50; nonmembers, $1.00.

Discussion of an advanced integrated space suit, suit loop, and backpack system of sufficient flexibility to meet the mission requirements of the manned orbiting laboratories and future space vehicles. In addition to flexibility, the system provides backup support to the cabin EC/LS system during emergencies and thus allows the backpack system with its expendables to be saved for "last ditch" measures only. The evolution of the space-suit subsystem is followed from the present Mercury, Gemini, and Apollo designs through the early manned orbiting laboratory concept on to the advanced orbiting laboratory for the post-1968 time period.

A64-20638
THE BIOLOGICAL EFFECTS OF LASER RADIATION.
Martin S. Litwin and Donald H. Glew (U.S. Army, Medical Research and Development Command, Surgical Research Branch, Washington, D.C.).

American Medical Association, Journal, vol. 187, Mar. 14, 1964, p. 842-847. 22 refs.

Investigation of the effects of laser radiation on animal tissues. Laser components, laser types, and operating principles are reviewed. Pathological effects on the gross as well as on the histological levels are considered. One instance of cancer genesis in human skin is reported. Clinical applications of the laser as retinal photocoagulator are evaluated. It is pointed out that while the lesion produced is extremely small and well localized, coagulated tissue at the borders of the cauterized area (necessary for firm binding of the detached retinal tissue to the underlying surface) is produced in only minimal amounts. Thus binding is not as firm as that seen after cauterization with the lower powered Meyer-Schwickerath photocoagulator. This difficulty has been overcome somewhat by performing multiple exposures. It is emphasized that the simple definition of biological effects of laser radiation presents as great a problem as that originally presented by the discovery of ionizing radiation.

A64-20648

ATMOSPHERIC NITROGEN AND ITS ROLE IN MODERN MEDICINE.

Leon E. Farhi (New York, State University, School of Medicine, Dept. of Physiology, Buffalo, N.Y.).

American Medical Association, Journal, vol. 188, June 15, 1964, p. 984-993. 44 refs.
Contract No. AF(615)-1095.

Investigation of the influence of atmospheric nitrogen on physiological respiration processes. Evidence is reviewed which shows that man and laboratory animals can live in environments with little or no nitrogen - i.e., that nitrogen is metabolically inert or nearly so. The mechanism by which sequestered gas pockets - such as a spontaneous pneumothorax - are resorbed and the role of nitrogen in regulating this process are considered. The effects of nitrogen in delaying the appearance of atelectasis due to bronchial occlusion are discussed. The fact that the ability of nitrogen to delay resorption of gas pockets may be harmful is exemplified by the case of decompression sickness. The discussion also presents the value of nitrogen as a diagnostic and research tool. Applications to the investigation of important aspects of lung function - e.g., adjustment of ventilation to perfusion, and the postnatal readjustment of the pulmonary circulation - are studied. It is also shown that nitrogen is suited for the evaluation of pulmonary blood disturbances that occur in some pathological conditions.

A64-20688

PERSONNEL SEATING RESEARCH FOR AIR FORCE AEROSPACE VEHICLES.

Richard L. Peterson (USAF, Systems Command, Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio).

Society of Automotive Engineers and American Society of Mechanical Engineers, Air Transport and Space Meeting, New York, N.Y., Apr. 27-30, 1964, Paper 851C. 17 p. 9 refs.
Members, $0.75; nonmembers, $1.00.

Discussion of the Air Force Dynamics Laboratory net seat research program. It is shown that net crew seat prototypes evaluated provide excellent body support during 1-g comfort studies and centrifuge exposure up to 16.5 g's. However, undesirable seat occupant rebound occurs during low-frequency vibration and ground-landing impact experiments. An experimental net seat system is presented, designed to eliminate seat occupant rebound without compromising comfort and sustained acceleration support properties. Prototype 16-g aft-facing passenger seats utilizing the net body support approach were designed, dynamically evaluated, and finally rejected due to excessive weight and failure to meet strength criteria. Several seating configurations utilizing the net seat technique for body support are discussed.

A64-20689

INTEGRATED HUMAN RESEARCH AND AEROSPACE MEDICINE.

Carl-Johan Clemedson (Gothenberg, University, Medical Faculty, Gothenberg, Sweden).

(Aerospace Medical Association, Annual Scientific Meeting, 35th, Miami, Florida, May 11, 1964.)
Aerospace Medicine, vol. 35, June 1964, p. 511-518.

Proposal of some of the research necessary in order to better accommodate man for future aerospace missions and to determine his performance capabilities under the known and foreseeable conditions of such missions. Covered are research in biologistics, physiology, and tolerance to acceleration, weightlessness, and radiation. It is noted that the cooperative effects of certain stresses- e.g., simultaneous exposure to heat, altitude, and vibration, may be detrimental where no one of the single stresses would.

A64-20690

EFFECT OF TONUS CHANGES ON PERCEIVED LOCATION OF VISUAL STIMULI.

Csaba Sziklai, Seymour Wapner, Heinz Werner (Clark University, Worcester, Mass.), and Joseph H. McFarland (Clark University; Worcester Foundation for Experimental Biology, Worcester, Mass.).

Aerospace Medicine, vol. 35, June 1964, p. 519-523. 12 refs.
PHS Research Grant No. MH-00348.

Report on a series of experiments dealing with the effect of muscle tonus on localization in the up-down dimension of space, as measured by the apparent eye line. Under darkroom conditions, a visual stimulus placed objectively in line with the subject's eyes is adjusted to a position where it appears to be in line with his eyes; i.e., the stimulus is adjusted with respect to the feet, under conditions assumed to change muscular tone: (a) when the subject is erect as compared with when he is tilted or supine; (b) when the tension of the antigravity musculature is increased; and (c) when the subject, while supine, has his feet touched as compared with when he has both his shoulders and feet touched. In general, the findings show a linkage between conditions known to change muscle tone in man and changes in perceptual localization in the up-down dimension.

A64-20691

SUBRADIATION EXPERIMENTS CONCERNING THE CONCEPT OF THE NATURAL RADIATION ENVIRONMENT.

James G. Eugster (Bern and Zurich Universities, Bern, Switzerland).

Aerospace Medicine, vol. 35, June 1964, p. 524-526. 7 refs.

Experiments concerning the zero radiation effect in the Simplon tunnel, Switzerland, and the zero activities of Artemia salina eggs, Hordeum bonus seeds, and green algae placed in the tunnel. The results show that green algae, with a high rate of innate activity, are most sensitive to a change in milieu, while the low-activity Artemia eggs exhibit the greatest resistance.

A64-20692

A PROPOSED SPEECH DISCRIMINATION TEST FOR SENIOR NAVAL AVIATORS.

Vernon C. Bragg and James W. Greene (U.S. Naval School of Aviation Medicine, Pensacola, Fla.).

Aerospace Medicine, vol. 35, June 1964, p. 527-529.

Description of a test to evaluate the naval aviator's ability to interpret speech in a background of high-intensity noise such as that found in an aircraft cockpit. The test consists of one hundred one-syllable words recorded in 100 db. of aircraft noise at a signal-to-noise ratio of + 15 db. Twenty-four USN Service Group I and three Service Group III naval aviators between the ages of forty and fifty were tested using two forms of the test. Mean scores showed no difference between groups despite difference in threshold acuity for pure tones. Retest revealed an expected improvement due to practice. The test is proposed as a realistic method for use in determining the senior aviator's qualification to perform in Service Group I.

A64-20693

DECOMPRESSION OF MICE IN ATMOSPHERES CONTAINING HELIUM OR ARGON IN PLACE OF NITROGEN.

James D. Witherspoon, Jacob E. Wiebers, William A. Hiestand, and Ann H. Heimlich (Purdue University, Dept. of Biological Sciences, Lafayette, Ind.).

Aerospace Medicine, vol. 35, June 1964, p. 529-532. 18 refs.
Purdue Research Foundation-supported research; National Institutes of Health Grant No. RG-8535.

Investigation of mouse survival on decompression in mixtures of oxygen and an inert gas. Mice slowly decompressed to 179 mm.

Hg survive longer after saturation with a helium-oxygen atmosphere in place of an argon-oxygen atmosphere or air. When mice are rapidly decompressed to pressures from 60 to 220 mm. Hg, previous saturation with the helium-oxygen atmosphere had little or no effect on survival. When mice were exposed in a helium-oxygen atmosphere as compared with air, (1) their oxygen consumption and carbon dioxide production were raised slightly, (2) their activity (body movements) and breathing rate were not altered, (3) their body temperatures were reduced, and (4) they became more tolerant to a combination of glycolysis inhibition and anoxic anoxia. The increased hypoxic resistance displayed by mice is seen to be the probable result of the reduction of body temperature or a change of energy storage or utilization by the body.

A64-20694

NEGATIVE (-Gz) ACCELERATION IN RELATION TO ARTERIAL OXYGEN SATURATION, SUBENDOCARDIAL HEMORRHAGE AND VENOUS PRESSURE IN THE FOREHEAD.

Otto H. Gauer and James P. Henry (Freie Universität, Berlin, West Germany; Southern California, University, Los Angeles, Calif.).

Aerospace Medicine, vol. 35, June 1964, p. 533-545. 62 refs.

Results of previously classified studies of the physiology of negative acceleration, performed in 1950-1951 at what are now the USAF Aerospace Research Laboratories, Wright-Patterson AFB, Ohio. Original observations are cited which demonstrate the change in the oxygenation of arterial blood and the enhanced pulmonary shunting of blood which occur during acceleration. Evidence is presented that the mechanisms underlying the subendocardial hemorrhages that appear during the forceful beating of a poorly filled ventricle, as in hemorrhagic shock, are due to isometric contractions, with consequent disturbances of the pressure relationships within the ventricular wall. The relation of such trauma to the possible stimulation of ventricular receptors triggering vasovagal syncope and to the subendocardial hemorrhages found in noradrenalin-treated states of hypovolemia, is discussed. The factors controlling pressure in the venous system during gravitational stress are analyzed. They include considerations of geometry, the available blood volume, and the elasticity of the vascular system. The significance of the angle made by the forward position of the eyes relative to the heart is recognized, and its importance is seen to be confirmed in other studies relating to high reentry-acceleration tolerance.

A64-20696

PHYSIOLOGICAL EFFECTS OF INDUCED HYPOXIA DURING INSTRUMENT FLYING.

Charles E. Billings, Mary F. Foley, and Charles R. Huie (Ohio State University, Dept. of Preventive Medicine, Aviation Medicine Research Laboratory, Columbus, Ohio).

Aerospace Medicine, vol. 35, June 1964, p. 550-553. 6 refs.
Scott Aviation Corp.-sponsored research.

Study of the physiological responses of twenty experienced pilots during flight at an altitude of 25,000 ft. Each subject is exposed in random order to four oxygen-nitrogen mixtures under double blind conditions. The mixtures provide tracheal oxygen tensions equivalent to those obtained for air breathing at sea level, 7000, 10,000, and 13,000 ft pressure altitude. It is found that the average metabolic cost of performing a simulated instrument approach in a light twin-engine aircraft is about 53% in excess of the resting oxygen uptake under each of the conditions studied. Ventilation and respiratory exchange ratios increase as tracheal oxygen tension is reduced; these alterations are seen to be due to mild hypoxia. It appears that performance of this task does not tend to prove hyperventilation. It is also found that the Müller-Frânz portable respirometer, properly maintained and calibrated, is an efficient and relatively precise tool for the study of metabolic variables in flight.

A64-20697

SUMMARY AND EVALUATION OF AIRCRAFT ACCIDENTS AND FATALITIES.

Horace S. Bell and Samuel P. Chunn (USAF, Life Sciences, Norton AFB, Calif.).

Aerospace Medicine, vol. 35, June 1964, p. 553-559.

Report on the cause factors and trends in USAF aircraft accidents that resulted in major injuries or death in 1957-1961. Although there has been a progressive decline, further progress toward a zero accident rate is seen to be necessarily slow. Two significant factors arising in the last 5-10 years are the increased retirement of experienced pilots and maintenance workers and the increased transfer of experienced personnel to the missile field. Recommendations for improved safety include the better reporting and investigation of accidents (and incidents), more frequent periodic training, and, since crash landings in high-speed aircraft are not tenable, increased emphasis on the rapid decision to eject at a safe altitude.

A64-20698

EJECTION SEAT ACCELERATIONS AND INJURIES.

Walton L. Jones, William F. Madden, and Gerald W. Luedeman.

(Aerospace Medical Association, Meetings, Los Angeles, Calif., Apr. 29, 1963.)
Aerospace Medicine, vol. 35, June 1964, p. 559-562. 7 refs.

Description of the program underway since 1958 to adapt the Martin-Baker Ejection Escape System to selected USN aircraft. Attempts are being made to reduce the g-loading and obtain better performance by means of a rocket-propelled ejection system that combines a lower boost phase with an even lower sustained-rocket-thrust phase. Of 165 USN aviators surviving Martin-Baker ejections since 1958, most of the 21% suffering vertebral injuries have returned to full flight status, with an apparent assist from early ambulation. Canopy ejections continue to present special problems which are being met in part by training the aviator to sit as low as possible before ejection.

A64-20699

INFLUENCE OF ENVIRONMENTAL TEMPERATURE ON THE TOXICITY OF OXYGEN.

Armand J. Gold, Elaine C. Silver, and Harry E. Hance (General Electric Co., Space Technology Center, Valley Forge, Pa.).

Aerospace Medicine, vol. 35, June 1964, p. 563-567. 14 refs.

Experimental studies on the mouse (Bar Harbor Strain C-57) and on the giant amoeba (Pelomyxa carolinensis) to determine the effects of temperature on chronic exposure to atmospheric oxygen. In the mice, results indicate increased sensitivity to oxygen with increased temperature; the LT_{50}'s for oxygen-room temperature and oxygen-100°F are, respectively, 100 and 35 hr. High temperatures appear to dominate the effect of oxygen, the LT_{50}'s for groups exposed to either oxygen or air at 110 and 115°F being approximately 1-2 hours. Evidence of oxygen toxicity (pulmonary edema and atelectasis) is found in the lungs of mice exposed to increased temperatures less than 100°F. Pulmonary hemorrhage is the only significant pathological finding in the lungs of mice exposed to oxygen or air at 100°F and above. Air-exposed amoebae in solution at room temperature increase their number by 87% after 72 hours. Oxygen-exposed amoebae show an increase of only 21%. The data suggest that oxygen effects (growth attenuation), evident at normal and near-normal temperatures, are abolished or replaced by high-temperature effects (cell disintegration).

A64-20700

GLAUCOMA INCIDENCE AND SIGNIFICANCE IN AVIATORS.

A. Merceir, G. Perdriel, P. Sole, J. Chevaleraud, and J. Graveline (Principal Center for Medical Examination of Flying Personnel, Paris, France).

Aerospace Medicine, vol. 35, June 1964, p. 567-571. 17 refs.

Results of intraocular pressure measurements of 1048 eyes, some examined three times over a period of 18 months, using Schiotz and Goldmann tonometry. In both civilian and military flying personnel, evidence is given of nearly 3% incidence of glaucoma. Visual fatigue and psycho-ocular interactions are discussed as possible contributing factors. The use of two successive weights in the Schiotz tonometry enabled the determination of intraocular pressure and scleral rigidity after conversion with Friedenwald's nomogram. Measurements of the ocular tension with Goldmann's applanation tonometer were more readily tolerated and gave results more consistently accurate from one examiner to the next and from one examiner to another. In the 0.85% of the cases in which glaucoma was found to be purely tonometric, with the ocular hypertension maintained at several successive examinations without any functional

or tonographic change, it is considered that these may later result in glaucoma with organic or functional change. The decision of whether to maintain flight qualification is seen to depend upon the degree of glaucoma, the effectiveness of medical therapy, and the state of the visual functions after miotic-induced contraction of the pupil. Regular periodic examination of the ocular tensions is recommended from age 35.

A64-20701

IS THERE A MOON ILLUSION IN SPACE?

Ingeborg Schmidt (Indiana, University, Div. of Optometry, Bloomington, Ind.).

Aerospace Medicine, vol. 35, June 1964, p. 572-575. 14 refs.

Review of ancient and modern theories concerning the apparent broadening of the Moon's disk as it approaches the horizon and comparison with the observations of pilots and astronauts. None of the more than 15 published hypotheses, dating back to antiquity, is found to adequately explain the illusion, which appears to depend on the apparent size of the Moon in the direction of enlargement, a terrain so oriented that it extends from the observer's feet toward the horizon, a time around sunset or sunrise, overlay produced by terrestrial objects or by clouds, and a hazy atmosphere. Interrogations of pilots reveal that during flight the Moon and stars appear larger at the horizon than overhead and that the phenomenon increases on descent. The observations of astronauts lead to the conclusion that something like a transitory Moon illusion exists in space, although not a very striking one, since none of the astronauts mentions a "large" horizon Moon.

A64-20702

INFLIGHT LOSS OF CONSCIOUSNESS.

J. Robert Dille and Pei Chin Tang (Federal Aviation Agency, Civil Aeromedical Institute, Oklahoma City, Okla.).

Aerospace Medicine, vol. 35, June 1964, p. 579-583. 26 refs.

Diagnosis of a case of inflight vertigo and subsequent 2-hr loss of consciousness in a private pilot, flying alone. Blood tests, radiographs of the skull and chest, and electrocardiographic studies revealed no abnormalities. There was no evidence of neurological disease. The differential diagnosis and the significance of findings of 5-7/sec theta waves in the patient's resting EEG, and high-voltage slow waves during caloric irrigation of the right ear, are discussed.

A64-20759

A REVIEW OF CRASHWORTHY SEAT DESIGN PRINCIPLES.

James W. Turnbow (Arizona State University, Tempe, Ariz.) and J. L. Haley, Jr. (Flight Safety Foundation, AVSER Div., New York, N.Y.).

Society of Automotive Engineers and American Society of Mechanical Engineers, Air Transport and Space Meeting, New York, N.Y., Apr. 27-30, 1964, Paper 851A. 10 p. 17 refs.
Members, $0.75; nonmembers, $1.00.

Review of the present area of knowledge of the factors pertinent to the design of crashworthy aircraft seats. Ultimate design load factors, based upon human tolerance to decelerating load, and anticipated loads in accident situations for three types of aircraft, are presented. The value of energy absorbing devices for seats is also discussed.

A64-20760

HUMAN FACTORS OF EMERGENCY EVACUATION.

Stanley R. Mohler, John J. Swearingen, Ernest B. McFadden, and J. D. Garner (Federal Aviation Agency, Office of Aviation Medicine, Washington, D.C.).

Society of Automotive Engineers and American Society of Mechanical Engineers, Air Transport and Space Meeting, New York, N.Y., Apr. 27-30, 1964, Paper 851B. 12 p. 32 refs.
Members, $0.75; nonmembers, $1.00.

Presentation of newly discovered principles concerning human factors in emergency evacuation of aircraft following survival accidents. A comprehensive summary and evaluation of all known emergency evacuation tests through December 1963 are presented. Human factors data resulting from tests conducted between July 1963 and February 1964 in a 132,000-gal indoor ditching pool, under extreme conditions of lighting, and at Lake Tenkiller, in eastern Oklahoma, are presented. Also, land tests are conducted using new escape devices, including the "Telescape" device. Lack of familiarity with emergency equipment on the part of the crew, plus certain equipment design defects, have doubled the escape time, and in certain instances have resulted in unsuccessful escapes. Designs enabling a minimum escape time of 90 sec are recommended for future civil aircraft. The results indicate the desirability of instituting changes in crew emergency evacuation training and in passenger briefing practices. Recommendations for improved personal survival equipment and for 25-g seats incorporating impact protection mechanisms are made.

A64-20783

TACTILE COMMUNICATION SYSTEMS FOR AEROSPACE APPLICATIONS.

Joseph Hirsch, H. Jerome Shafer, Isaac Kadushin, and Eitan Ailon (Technion - Israel Institute of Technology, Haifa, Israel).

American Institute of Aeronautics and Astronautics, Annual Meeting, 1st, Washington, D.C., June 29-July 2, 1964, Paper 64-421. 8 p. 15 refs.
Members, $0.50; nonmembers, $1.00.

Experimental investigation of systems of coded vibratory stimuli, to provide increased efficiency and safety in aerospace communication and control. Tests were conducted on a basic tactile system consisting of a single apparatus having sensitive vibration receivers controlled by five fingers of the "listener." Provisions were made to use existing telephone lines for "tactile communications." Attenuation of the tactile vibratory signals and noise through the telephone exchange were found to be negligible. A single-axis longitudinal system was simulated on an analog computer to investigate acceleration measuring devices defining the movement of an object in space. Rate information was tactually sensed by the ground control operator who is thereby provided with an additional channel of information and is able to correct the object's motion. The pilot's performance with and without the tactile mode is compared, and it is found that improved control resulted from using the tactile link.

A64-20838

VISUAL SEARCH.

Ulric Neisser.

Scientific American, vol. 210, June 1964, p. 94-100, 102.

Study of visual search as a tool with which to investigate the hierarchy of separate mechanisms involved in perceptual analysis. The processes studied are those which are on the boundary between perception and thought. The subject is asked to scan a list, usually consisting of 50 items, to find a specified "critical item," or target. The lists are generated by a computer; each item is a group of letters, a group of letters and digits, or a word, all drawn at random from a pool of items with the desired characteristics. The subject peers through a window into a box within which the experimenter positions a list. When the subject is ready to begin scanning, he turns a switch to illuminate the list and start an electric timer. He scans the list until he finds the target, then turns the switch to stop the clock. The speed with which a person scans tends to decrease during the course of a long experiment. With repeated scans the subjects discover the perceptual operations that seem to be minimally sufficient for the problem. The speed of a search is independent of the number of different targets that can terminate it successfully.

A64-20850

ASTRONAUT PART TASK TRAINERS.

Marvin Fischthal and Arthur Walsh (Grumman Aircraft Engineering Corp., Bethpage, N.Y.).

Society of Automotive Engineers and American Society of Mechanical Engineers, Air Transport and Space Meeting, New York, N.Y., Apr. 27-30, 1964, Paper 866H. 6 p.
Members, $0.75; nonmembers, $1.00.

Discussion of the design considerations for Part Task Trainers (PTT) to be used in training astronauts in discrete portions of a flight profile. These devices can operate as rendezvous trainers and as lunar landing trainers. They consist of a computer complex, simulated cabin interior, external out-the-window display, and an instructor's complex. It is felt that the achieving of a design philosophy requires a good working knowledge of the purpose of this type of trainer and the state of the art of various electronic,

optical, and mechanical devices required by the trainer. Selecting the computer and optical systems is a difficult task requiring many compromises and trade-offs to arrive at the best and most economical system possible.

A64-21023

ATTENTION, VIGILANCE, AND CORTICAL EVOKED-POTENTIALS IN HUMANS.

Manfred Haider, Paul Spong, and Donald B. Lindsley (California, University, Dept. of Psychology, Los Angeles, Calif.).

Science, vol. 145, July 10, 1964, p. 180-182. 10 refs.
Contracts No. DA-49-007-MD-722; No. Nonr 233(32).

Investigation of computer-averaged potentials evoked from the cortex which were recorded to nonsignal stimuli and to randomly interspersed signal stimuli requiring detection and response during prolonged visual vigilance. It is stated that, as detection efficiency diminished over time, the amplitude of evoked responses to nonsignal stimuli decreased and latency increased. Fluctuations in vigilance (attentiveness) during the course of the task also were accompanied by corresponding changes in evoked potentials to nonsignal stimuli. More specific lapses of attention, revealed by detection failures, resulted in average evoked responses of lower amplitude to missed, as compared with detected, signals.

A64-21118

THE POSSIBILITY OF SUBSTITUTING HELIUM FOR ATMOSPHERIC NITROGEN IN SPACESHIP CABINS, AND THE EFFECTIVENESS OF USING A HELIUM-OXYGEN MIXTURE FOR PRESSURE-SUIT VENTILATION [O VOZMOZHNOSTI ZAMENY AZOTA VOZDUKHA GELIEM V KABINAKH KOSMICHESKIKH KORABLEI I EFFEKTIVNOSTI ISPOL'ZOVANIIA GELIO-KISLORODNOI SMESI DLIA VENTILIATSII KOSMICHESKOGO SKAFANDRA].

A. G. Dianov.

Kosmicheskie Issledovaniia, vol. 2, May-June 1964, p. 498-503. 14 refs. In Russian.

Experimental investigation showing that a human subject can function adequately over prolonged periods of time (in the order of 25 days) in a hermetically closed cabin, in the atmosphere of which nitrogen is replaced by helium. Because of the high heat conductivity of an oxygen-helium mixture, the range of thermal comfort in the experiments is found to lie between 24.5° and 27.5°C during the day, and between 26° and 29°C at night. A shift in the voice frequency of a subject by 0.7 of an octave in the direction of higher frequencies is observed. Experiments lasting 24 hours showed that ventilation of the pressure suit with a helium-oxygen mixture substantially increases the heat transfer of a subject at ambient temperatures of 27° to 30°C.

A64-21181

PRESENCE OF OZONE IN CABINS OF HIGH-ALTITUDE AIRCRAFT.

L. S. Jaffe and H. D. Estes (Federal Aviation Agency, Aviation Medical Service, Washington, D.C.).

(American Institute of Aeronautics and Astronautics, Summer Meeting, Los Angeles, Calif., June 17-20, 1963, Paper 63-234.)
Journal of Aircraft, vol. 1, May-June 1964, p. 157, 158. 6 refs.
[For abstract see Accession no. A63-19327 17-16]

A64-21182

GASEOUS ENVIRONMENT DURING SPACE MISSIONS.

Frank J. Hendel (North American Aviation, Inc., Space and Information Systems Div., Downey, Calif.).

Journal of Spacecraft and Rockets, vol. 1, July-Aug. 1964, p. 353-364. 92 refs.

Survey of recent work on the gaseous environment for spacecraft, with particular attention to oxygen management, toxicity, and environment selection. The methods of managing oxygen, in increasing order of complexity, are: (1) open cycle, (2) physical separation, (3) absorption of CO_2 by expendable chemicals, (4) sorption of CO_2 by regenerable sorbents, (5) simultaneous absorption of CO_2 and production of oxygen, and (6) closed and semiclosed ecological cycles. The human body defends itself from toxic compounds by excretion and elimination, formation of detoxication conjugates, and detoxication by other body actions. The Russian cosmonauts have used air at 14.7 psia in their space flights and the Americans, pure oxygen at 5 psia. The latter environment is simpler but has a greater fire hazard. It has been shown that man can tolerate such an atmosphere for at least 2 to 4 weeks. However, for longer missions, a two-gas atmosphere at pressures between 7 and 10 psia is advisable. The second gas may be nitrogen, helium, or perhaps neon.

A64-21332

DISTORTION OF THE TEMPORAL PATTERN OF SPEECH - INTERRUPTION AND ALTERNATION.

A. W. F. Huggins (Harvard University, Center for Cognitive Studies, Cambridge, Mass.).

Acoustical Society of America, Journal, vol. 36, June 1964, p. 1055-1064. 13 refs.
Research supported by the Carnegie Corp. and Ford Foundation.

Experimental investigation of the effect described by Cherry, namely- that a subject can repeat virtually all of a continuous message that is switched alternately to his left and right ears, except at certain critical rates of alternation around 3 cps. In the first experiment, the intelligibility of continuous speech was measured as a function of rate of alternation, which ranged from 1 to 16 cps. Two such functions were measured, one using normal speech and the other using the same speech played back at slightly increased speed. Comparison of the two functions shows that, when the playback speed of the speech was increased, the rate of alternation that gave subjects most difficulty also increased by the same factor. Therefore, the effect cannot be ascribed to any processing time that is independent of the speech, but must occur because the speech reaches each of the listener's ears in segments, as a result of which some portions of the speech wave arrive in such a form that he cannot extract the cues from them. A second experiment is included.

A64-21333

PERCEPTUAL BASES OF SPEAKER IDENTITY.

William D. Voiers (Sperry Rand Corp., Research Center, Sudbury, Mass.).

Acoustical Society of America, Journal, vol. 36, June 1964, p. 1065-1073.
Research sponsored by Texas Instruments, Inc., and Sperry Rand Research Center.

Experimental investigation to determine the number and nature of the basic voices perceived to differ from each other by a typical listener. A group of 32 listeners described their perceptions of 16 voices by means of a semantic-differential rating form. Analysis of variance was performed to determine the contributions of speakers, listeners, and various situational parameters to the variance of ratings on each item. Factor-analytic techniques were employed to determine the dimensionality of the speaker effect, the listener effect, and the effect of the interaction of speakers and listeners. Four factors - clarity, roughness, magnitude, and animation - were found to account for an average of 88% of the variance in mean ratings given speakers on each of 49 items. Six dimensions were found to account for the common-factor variance in constant errors associated with listeners. Five dimensions were found to account for the common-factor variance of the observed interaction of speakers and listeners.

A64-21334

TEMPORARY HEARING LOSSES FOLLOWING EXPOSURE TO PRONOUNCED SINGLE-FREQUENCY COMPONENTS IN BROAD-BAND NOISE.

Alexander Cohen and Karl C. Baumann (U.S. Public Health Service, Div. of Occupational Health, Cincinnati, Ohio).

(Psychonomic Society, Annual Meeting, 4th, Bryn Mawr, Pa., Aug. 1963.)
Acoustical Society of America, Journal, vol. 36, June 1964, p. 1167-1175. 14 refs.

Experimental investigation to determine if, for equal total energies, a broad-band noise with a strong tonal component is more noxious to hearing than one having a more continuous spectrum. For this purpose, temporary hearing losses were observed for 20-min exposures to pure-tone frequencies (500, 1000, 2000, 4000 cps) which were independently mixed in various strengths with a broad-band noise to create different exposure conditions involving a strong tonal component in a noise field. All such losses were compared with those resulting from equally intense exposures to just the broad-band noise that had a fairly uniform distribution of energy across its component frequencies. Depending upon their frequency and

prominence level, strong pure tones in noise caused greater losses than those due to equivalent exposures to a continuous spectrum noise.

A64-21335
ACOUSTIC-IMAGE LATERALIZATION JUDGMENTS WITH BINAURAL TRANSIENTS.
B. M. Sayers and F. E. Toole (London, University, Imperial College of Science and Technology, Dept. of Electrical Engineering, Engineering in Medicine Laboratory, London, England).
Acoustical Society of America, Journal, vol. 36, June 1964, p. 1199-1205. 6 refs.

Review of experiments to establish the extent of lateralization of sound images established by the binaural interaction of clicks with clicks or click pairs. Listeners were presented with trains of acoustic clicks of about 40 to 50 db from earphones energized by pulses of 0.1 msec width; each pulse on one channel was associated with a pulse pair on the second channel. The listener reported a judgment of the perceived click-image position at each presentation of the binaural stimulus, and the averaged positional judgments are graphed as a function of an independent parameter. The results show that two images formed by the interaction of a click with each member of a click pair can be readily identified.

A64-21336
DETECTION OF TONE PULSE OF VARIOUS DURATIONS IN NOISE OF VARIOUS BANDWIDTHS.
G. van den Brink (RVO-TNO, Institute for Perception, Soesterberg, Netherlands).
Acoustical Society of America, Journal, vol. 36, June 1964, p. 1206-1211. 13 refs.

Experimental investigation of noise-masked hearing-threshold for pulses of 800 cps over a wide range of pulse durations and bandwidths of the masking noise. The tone pulses of 800 cps were presented randomly in time, and the masking noise was presented continuously. The bandwidth of the filter was continuously variable from 2 to 220 cps. Other filters were used for 500, 1000, and 2000 cps. The side slopes of the band filter were at least 100-db/octave. Noise, from the transmitting band, was at least 50-db down. Variation of transmission in the horizontal part was maximally 1 db for the greatest bandwidths. The slope of the threshold vs pulse-duration curve was found to be 3 db per factor 2 in time, when white-masking noise is used, and often less when bands of masking noise are used. These measurements indicate the existence of a mechanism that adjusts the width of the critical band in such a way that detection of the stimulus occurs more efficiently than it would in the case of a fixed width of the critical band.

A64-21610
EXPERIMENTS ON THE EFFECTS OF INPUT VARIABLES ON MULTI-TARGET ALPHABETIC DISPLAYS.
Warren H. Teichner, Edna Dahlquist, Nancy Eddy, and Sanford Pesner (Massachusetts, University, Institute of Environmental Psychophysiology, Amherst, Mass.).
IN: NATIONAL WINTER CONVENTION ON MILITARY ELECTRONICS, 5TH, LOS ANGELES, CALIF., FEB. 5-7, 1964, PROCEEDINGS. VOLUME 3.
Convention sponsored by the Professional Technical Group on Military Electronics, Institute of Electrical and Electronics Engineers.
Edited by R. F. Lander.
North Hollywood, Western Periodicals Co., 1964, p. 14-15 to 14-22. 11 refs.
Contract No. 19(628)-290.

Discussion of experimental results showing that the accuracy of reporting the data from briefly exposed multitarget symbolic displays, in which each display-response pair within a series of successive displays is an independent event, is inversely related to the display load and the ordinal position of the display counting back from the last one seen. It is also found that accuracy of report is poorer when a report is required to each display than when the response rate is lower even though, at the lower rates, the subject cannot anticipate when the report would be required. The accuracy of report is not affected by the distribution of loads in the display series nor is it affected by the display presentation rate as is the case in sequentially dependent series.

LC ENTRIES

A64-80575
EFFECT OF VERY BRIEF INTERPOLATED ACTIVITY ON SHORT-TERM RETENTION.
F. Joseph Mortenson and Henry Loess (College of Wooster, Ohio).
Perceptual and Motor Skills, vol. 18, Jun. 1964, p. 797–803. 7 refs.

Short-term retention of 4-, 6-, and 8-digit messages was tested after 1 and 10 seconds. Retention intervals were either unfilled or partially filled following a procedure used by Conrad (1960). Retention of 4-digit messages was essentially perfect under all conditions. Retention after 1 second was significantly reduced for 6- and 8-digit messages if "0" was interpolated during the interval. Retention of 8-digit messages was significantly reduced, but retention of 6-digit messages was not reduced, by interpolation of "0" in a 10-second interval. Results are interpreted as being compatible with both decay and interference interpretations of forgetting and as indicating that interpolation of a brief activity will significantly reduce retention only when messages approach the limit of memory span.

A64-80576
LONG-TERM OBSERVATION OF THE AUTOKINETIC ILLUSION: FREQUENCY AND DIRECTION OF MOVEMENT.
Robert M. Stern (Indiana U., Indianapolis).
Perceptual and Motor Skills, vol. 18, Jun. 1964, p 825–830. 8 refs.
Contract Nonr-908-(15).

This study was designed to test the following hypotheses: (a) reports of autokinetic movement increase with increasing exposure time; (b) reports of movement in the vertical plane occur with greater frequency than reports of movement in the horizontal plane. Forty subjects, who were told that they were radar watchkeepers, observed a pinpoint of light in a dark room for 30 minutes and indicated the direction of apparent movement. The results obtained supported both hypotheses. The increase in reports of movement is accounted for in terms of increased suggestibility due to the effects of sensory deprivation. A possible explanation for the greater frequency of reports of vertical movement is discussed in terms of Kuennapas' theory of the relevance of the horizontally-extended oval shape of the visual field for the horizontal-vertical illusion.

A64-80577
STEREOSCOPIC FACILITATION OF SIGNAL DETECTION.
Daniel Robinson (Columbia U., Electronics Res. Labs., Morningside Heights, N.Y.)
Perceptual and Motor Skills, vol. 18, Jun. 1964, p. 839–840.
Contract DA-069-ORD-2287.

The effects of differentially filtering light in the eyes during tracking are investigated. Subjects tracked high acceleration targets (0.6 g) at a signal-to-noise ratio of 0.0 decibels. The effects are small, but the data suggest a depth enhancement of performance by differentially filtering the eyes.

A64-80578
KINETIC FRAME EFFECTS: II. VISTA MOTION.
K. Sayons (St. Louis U., Mo.)
Perceptual and Motor Skills, vol. 18, Jun. 1964, p. 857–863. 10 refs.

Perception of a three-dimensional kinetic vista resulted when subjects viewed a quadrilaterally moving frame. The frame was a white rectangle continuously expanding and contracting in size, with a black stationary line in the center. Two vista effects were obtained: (1) wall-penetrating AdAb motion, i.e., when subjects focused on the line it oscillated back and forth in a frame which was seen as a hole in the wall and (2) a pyramid effect, i.e., the rectangle became solid resembling a shell of a pyramid, or a "wooden funnel popping out at you" when subjects focused upon it. Vista effects broaden the family of motion perspective phenomena and suggest that the kind of motion perspective depends not only on Gibson's principle of perspective transformations but also on the area of focus.

A64-80579
JUDGMENT OF SLANT WITH CONSTANT OUTLINE CONVERGENCE AND VARIABLE SURFACE TEXTURE GRADIENT.
A. H. Smith (Defence Res. Med. Labs., Toronto, Canada).
Perceptual and Motor Skills, vol. 18, Jun. 1964, p. 869–875.

Twenty-four observers estimated the slants of rectangles and trapezia, using monocular vision with fixed head under reduced viewing conditions. The trapezia were the frontal-parallel projections of the rectangles at 45° slant. The rectangles, one untextured and three textured, were presented in the frontal-parallel plane and at 15°, 30°, 45°, and 60° slant. The trapezia, one untextured and three textured, were presented only in the frontal-parallel plane. For the rectangles at 45° and the trapezia, the six textured forms presented four variations in texture density gradient produced by photographing a uniform but random texture of solid circles in the frontal-parallel plane and at 45° slant. The estimated slants for the rectangles at 45° slant and the trapezia at 0° slant were generally equivalent, differences in texture notwithstanding. Outline convergence was almost exclusively the effective cue for slant and texture was generally ineffective.

A64-80580
PHENOMENAL DISPLACEMENT OF LIGHTS IN APPARENT MOVEMENT AS A FUNCTION OF SEVERAL BACKGROUND STIMULI.
Raymond M. Daly, Robert G. Riedel, Paul von Ebers, and Richard A. Maier (Loyola U., Chicago, Ill.)
Perceptual and Motor Skills, vol. 18, Jun. 1964, p. 877–881. 7 refs.

The radius of a pattern of lights in apparent motion was estimated by 60 subjects under various conditions. It was found that a white outline circle placed behind the lights would increase the estimation of the radius; the larger the circle, the larger the estimation of radius. Apparently when the circle is smaller than the true radius of the lights, there is a contrast effect; when the circle is larger, an assimilation effect. These results are consistent with results of other studies investigating a shift from assimilation to contrast under different sensory conditions.

A64-80581
MOTOR-SENSORY FEEDBACK VERSUS NEED IN ADAPTATION TO REARRANGEMENT.
Richard Held (MIT, Cambridge, Mass.) and Harutune Mikaelian (Bowdoin Coll., Brunswick, Me.)
Perceptual and Motor Skills, vol. 18, Jun. 1964, p. 685–688. 10 refs.
Grant NIMH-M-3657.

Eleven subjects wore prism goggles that occluded their left eyes as they held a wedge in front of their right eyes causing an 11° lateral deviation of the visual field. Each subject was exposed under two conditions for 50-minute periods, walking and self wheeling. Under both conditions the subjects moved over approximately the same path. After the subjects had propelled themselves in the wheelchair, they showed little, if any, compensation for the prism rearrangement despite their apparent need to take account of their directional errors and to correct them. The information available to them concerning their movement with its visual feedback did not produce compensation for the rearrangement introduced by the prisms; this result is consistent with the interpretation which discounts the alleged importance of need in the absence of the appropriate motor-sensory feedback.

A64-80582
EFFECT OF SOME PERSONALITY VARIABLES ON ELECTRICAL VESTIBULAR STIMULATION.
John J. Dunstone, Ernest Dzendolet, and Otto Heucheroth (Massachusetts U., Amherst).
Perceptual and Motor Skills, vol. 18, Jun. 1964, p. 689–695. 15 refs.
Grant PHS-G-NB-03675-02.

Seventeen graduate student subjects were divided into higher and lower scoring groups on 13 scales of the Minnesota Multiphasic Personality Inventory (MMPI). Their objective and subjective absolute thresholds (RL) to sinusoidal electrical stimulation at 1.0 and 0.20 cycles per second, applied by electrodes on the mastoid processes, were determined. A mean difference score between these RLs was calculated. Analyses of variance showed that significant differences were present at 0.20 cycles per second in the objective RLs for the Depression, Social Introversion-Extraversion, and Manifest Anxiety scales, in the subjective RL for Paranoia, and in the difference score for Paranoia. At 1.0 c.p.s., significant differences occurred in the subjective RLs for the Hysteria, Psychopathic Deviate, and Paranoia scales, and in the difference score for Paranoia. The results with the Manifest Anxiety scale were discussed in terms of a Hull-Spence framework. The lowering of the objective RLs at 0.20 c.p.s. was discussed as a possible mechanism for facilitating the appearance of motion sickness symptoms.

A64-80583
REACTION TIMES TO REGULARLY RECURRING VISUAL STIMULI.
Lewis R. Aiken and Malcolm Lichtenstein (U.S. Navy Electronics Lab., San Diego, Calif.)
Perceptual and Motor Skills, vol. 18, Jun. 1964, p. 713–720. 7 refs.

In this experiment, which was concerned with reaction times to regularly recurring visual stimuli, four experienced subjects made 21 serial responses at eight interstimulus intervals with eight replications each. The results show that the relationship between interstimulus time interval and reaction time to regularly recurring visual stimuli is best depicted as an increasing function, which reaches an asymptote at a different time interval for each subject. In addition, practice results in a greater decrease in reaction time for the 1- and 2-second interstimulus intervals, and especially for the former, than for longer intervals; this effect is most pronounced after one experience with the given interstimulus interval.

A64-80584
TRANSFER OF A COMPLEX PERCEPTUAL SKILL.
Emerson Foulke (Louisville, U., Ky.)
Perceptual and Motor Skills, vol. 18, Jun. 1964, p. 733–740. 12 refs.

Communication systems that depend upon stimulation of the skin will be more flexible and useful if it is possible to shift to new sets of loci in

accordance with the needs of particular situations. However, the feasibility of making such shifts will depend upon the amount of transfer that can be expected. To explore this problem, an experiment was performed in which braille readers served as subjects. They were required to read lines of braille characters with each of eight fingers. Performance was best when the forefingers were used and fell off sharply as the little fingers were approached. Explanations of the results in terms of anatomical, physiological and experimental factors were discussed. Some implications for cutaneous communication systems in general were suggested.

A64-80585
AUTONOMIC LEVELS AND LABILITY, AND PERFORMANCE TIME ON A PERCEPTUAL TASK AND A SENSORY-MOTOR TASK.
Paul A. Obrist, Shannon I. Hallman, and Donald M. Wood (North Carolina U., Chapel Hill).
Perceptual and Motor Skills, vol. 18, Jun. 1964, p. 753–762. 19 refs.
Contract AF 33(657)-8763; and Foundations Fund for Research in Psychiatry Block Grant B59-32.

This experiment was intended to evaluate further an hypothesis in which perceptual and sensory-motor performances were considered to be influenced by autonomic processes via autonomic regulation of cortical activity. For this purpose, lability and level measures of sudomotor activity and heart rate were obtained during rest and performance in 54 male subjects. The hypothesis was consistently supported in seven significant or near-significant correlations out of a possible 14. Faster performance time on the sensory-motor task was found with subjects having low resting heart rate, increased heart-rate variability during performance and low levels of skin resistance. Faster performance time on the perceptual task was found in subjects with a high frequency of galvanic skin response activity during performance. Also, an interaction effect was suggested between some of the autonomic measures, being most pronounced in the perceptual task.

A64-80586
A TACHISTOSCOPIC STUDY OF FIGURAL AFTEREFFECT (FAE).
David V. Moseley (Huyton Child Guidance Clinic, Liverpool, England).
Perceptual and Motor Skills, vol. 18, Jun. 1964, p. 882.

Preliminary tachistoscopic studies of figural aftereffect (FAE) suggest that its duration is a function of the number of exposures, interval length between successive exposures, summation, and fatigue effect. Cortical determination of FAE is discussed.

A64-80587
TRACKING ROTARY MOTION AFTEREFFECT WITH DIFFERENT ILLUMINATIONS OF INSPECTION AND TEST FIELDS.
P. L. Ross and M. M. Taylor (Defence Res. Med. Labs., Toronto, Canada).
Perceptual and Motor Skills, vol. 18, Jun. 1964, p. 885–888.

Taylor's psychophysical theory of figural aftereffects was used to predict the effect of changes in illumination of inspection and test fields on the amount and the rate of decay of the rotary motion aftereffect. As predicted, the brighter inspection disc produced more aftereffect, while the brighter test disc produced a smaller and faster-decaying aftereffect.

A64-80588
JUDGMENT OF VOLUME FROM PHOTOGRAPHS OF COMPLEX SHAPES.
Richard G. Pearson (Carnegie Inst. of Tech., Schenley Park, Pittsburgh, Pa.)
Perceptual and Motor Skills, vol. 18, Jun. 1964, p. 889–900. 10 refs.
Contract CA-44-177-AMC-888 /T/.

Observers judged the volume reduction of 40 distorted metal containers from photographs. Hypotheses regarding the role of amount of information provided by photographs, complexity of damage to the container, past experience of the observer, and memory for visual forms were tested in a study using 279 subjects. Findings revealed judgment accuracy to vary as a complex function of angular disparity between photographs, number of photographs, type of object, stimulus characteristics of individual containers, and degree of distortion. Volume reduction of "square" objects was judged more accurately than that of "round" objects. Individual observers were found to be reasonably consistent from one type of object to another in over- or underestimating volume reduction. These results are significant in estimating damage to airplanes from photographs during aircraft accident investigations.

A64-80589
EFFECT OF THREE KINDS OF KNOWLEDGE-OF-RESULTS INFORMATION ON THREE MEASURES OF VIGILANCE PERFORMANCE.
Ralph M. Chinn (Morehouse College, Atlanta, Ga.) and Earl A. Alluisi (Louisville U., Ky.)
Perceptual and Motor Skills, vol. 18, Jun. 1964, p. 901–912. 17 refs.

Ten subjects in each of eight groups individually performed a watchkeeping task of 1-hour duration. Each group was presented one of the eight factorial combinations of the presence (or absence) of three different kinds of knowledge of results (KR), i.e., KR regarding missed signals, correctly detected signals, and false responses. The results indicated that KR regarding missed signals produced a significant decrease in the total number of false responses, and that KR regarding correct detections produced a significant decrease in the proportion of missed signals. When KR regarding false responses was given, there was both a significant increase in reaction time to correct detections and a significant decrease in the number of false responses. In short, the effect of providing a specific type of information in a watchkeeping task appears to be specific to the measure of performance efficiency employed. A discussion is included of the interpretation of these results.

A64-80590
TIME ESTIMATES MEASURED BY REPRODUCTION.
Whitman Richards (MIT, Cambridge, Mass.)
Perceptual and Motor Skills, vol. 18, Jun. 1964, p. 929–943. 16 refs.
Grants NSG-496; and NIGMS-G-3TIGM-1064-02.

Four subjects, two adults and two children, were asked to reproduce time intervals. Contrary to expectation, the time estimates can not be described by a single monotonic function of the actual time. However, for each individual, a family of power functions having the same constant exponent can adequately fit the data. Therefore, there are several objectively measured times which are reproduced most exactly for each individual. This fact implies that internal rhythms serve as cues for time estimates. For all subjects, the times reproduced most exactly are shown to be approximately 2^n times 1.5 seconds, where n has integer values.

A64-80591
OBSERVATIONS ON THE DIURNAL TEMPERATURE VARIATION OF CYNOMOLGUS MONKEYS (MACACA IRUS) AND ON THE EFFECT OF CHANGES IN THE ROUTINE LIGHTING UPON THIS VARIATION.
Shigeo Honjo, Tooru Fujiwara, Masao Takasaka, Yasuko Suzuki, and Kiyoshi Imaizumi (Natl. Inst. of Health, Dept. of Veterinary Sci., Tokyo, Japan).
Japanese Journal of Medical Science and Biology, vol. 16, Aug. 1963, p. 189–198.

Cynomolgus monkeys caged individually in an animal room permitting the sunlight to enter freely showed a distinct diurnal temperature variation (d.t.v.) of the body temperature. The maximum temperature (mean = 37.42° C.) was recorded at 4 p.m. and the minimum (mean = 37.42° C.) was at 4 a.m. The d.t.v. pattern of monkeys similarly contained, but receiving artificial illumination by fluorescent lamps between 10 a.m. and 5 p.m., preceded and followed by entire darkness, was essentially the same as described for the sunlight condition (the control pattern). The inversion of the d.t.v. pattern was induced one to two weeks after the inversion of routine lighting. In this case, lights were on during the 5 p.m. to 10 a.m. period. The maximum temperature was obtained at 10 a.m. and the minimum was at 4 p.m. When monkeys were left continuously in entire darkness or in artificial light, the normal control pattern of d.t.v. was apparently lost, and the d.t.v. range decreased. The altered patterns of d.t.v. returned to that of the control condition when the lighting procedure of the latter was resumed. Although the d.t.v. pattern of these monkeys was dependent upon the given lighting condition, the aftereffect of the preexisting condition remained for some time.

A64-80592
GENETIC RELATIONSHIPS BETWEEN THE ORGANIC MATTER IN METEORITES AND SEDIMENTS.
Egon T. Degens (California Inst. of Tech., Div. of the Geol. Sciences, Pasadena).
Nature, vol. 202, Jun. 13, 1964, p. 1092–1095. 28 refs.
American Chemical Society-supported research.

Data supporting the abiotic nature of finely disseminated organic matter in carbonaceous chondrites are presented. Independent of whether biogenic or abiogenic organic molecules become incorporated into a rock, the final fossil organic residue will be chemically and structurally similar. Even organic compounds such as hydrocarbons generated during diagenesis from the finely disseminated organic debris will not yield information on the genetic nature of the precursor material. In analogy, abiotically synthesized extraterrestrial organic matter will chemically resemble the bulk of the ancient terrestrial organic compounds, with the exception of a few compounds, for example, metal-complexed porphyrins and possibly the bases of the purines and pyrimidines, which have so far been formed only here on Earth. It is concluded that fossil biogenic compounds differ from abiotic, meteoritic, and possibly primordial terrestrial organic matter only in a genetic, but not in a chemical, sense. This inference is supported by the lack of optical rotation in various organic fractions of meteorites and by stable isotope investigations.

A64-80593
EFFECTS OF HYPOXIA ON IRON ABSORPTION AND MOBILIZATION IN THE RAT.
Georg W. Strohmeyer, Stephen A. Miller, Robert W. Scarlata, Edward W. Moore, Mortimer S. Greenberg, and Thomas C. Chalmers (Lemuel Shattuck Hosp., Boston, Mass.; Harvard Med. School, Dept. of Med.; and Tufts U. Med. School, Boston, Mass.)
American Journal of Physiology, vol. 207, Jul. 1964, p. 55–61. 21 refs.

Contract DA-49-007-MD-781; and Natl. Inst. of Arthritis and Metab. Diseases Grant AM-01146.

Rats exposed to an atmosphere of 10% oxygen increase their absorption of a test dose of iron after 6 to 8 hours. Release of tissue storage iron begins within 2 hours of the start of hypoxia and continues for at least 8 hours. An oral iron load does not prevent the release of tissue iron in response to hypoxia. Iron-loaded rats also release iron from storage depots and increase their minimal absorption in response to hypoxia. Iron-deficient rats apparently have a diminished tissue release and also increase absorption above their elevated baseline levels. Xanthine loading had no effect on the release of tissue iron or changes in absorption with hypoxia, and there was no evidence that changes in xanthine oxidase activity in the liver or bowel were directly associated with tissue release or absorption of iron.

A64-80594
HOW TO PRESERVE THE HEALTH OF THE FLYING PERSONNEL [KAK SOKHRANIT' ZDOROV'E LETNOMU SOSTAVU].
A. Severskii.
Moskva, Izdatel'stvo Dosaaf, 1963, 163 p.

This brief review of aeromedical principles and problems is concerned with the following aspects: (1) psychophysiological characteristics of flight; (2) personal hygiene of the aviator; (3) fatigue and overexertion; (4) scheduling of flight activity; (5) scheduling of rest periods; (6) physical demands on the organism; (7) flight feeding; (8) toxic effects of alcohol; (9) toxic effects of tobacco; and (10) duties of the flight surgeon.

A64-80595
ALONE IN THE UNIVERSE?
John W. Mac Vey.
New York, MacMillan Co., 1963, xi+274 p. 38 refs. $5.95.

This book contains speculations on extraterrestrial life, its chances of existence, its probable forms, and possibilities of communicating with rational beings in the remote regions of the universe. Evolution of man on earth either from spontaneous origin or from biological materials brought here by meteorites is discussed. Theories endeavoring to account for the beginnings of the universe and implications of close-to-speed-of-light velocity travels (close paradox) are reviewed.

A64-80596
ANALYSIS OF HUMAN MOTION: A TEXTBOOK IN KINESIOLOGY.
M. Gladys Scott (State U. of Iowa, Iowa City).
2nd edition. New York, Appleton-Century-Crofts, 1963, ix+443 p. refs. $6.50.

This book presents a complete discussion of the principles of anatomy, physiology, and the mechanics of motion in the human body. Specific analyses of human activities include chapters on manipulative posture and static positions of the body, locomotion, fundamental skills, the characteristics of skill, and evaluation of the hand as a functional unit in movement. The mechanical efficiency of the body and factors pertaining to muscle action are discussed.

A64-80597
RESCUE FROM THE AIR AND IN SPACE.
James C. Sparks, Jr.
New York, Dodd, Mead and Co., 1963. 160 p. $3.50.

This book gives the history of the various aspects of air rescue. Operations of the Air Rescue Service in war and peace throughout the world are related. The history of the development of facilities and equipment for the air evacuation of the sick and wounded are reviewed. One chapter is devoted to describing various special rescue devices for use under different conditions. Special uses for helicopters and jet aircraft are discussed. Problems of rescuing astronauts from space, such as an astronaut stranded in orbit, are analyzed. The role that the Air Rescue Service played in the Mercury space flights is recounted.

A64-80598
EFFECT OF THE THORACO-PULMONARY MECHANICAL CHARACTERISTICS ON THE VENTILATORY PATTERN OF NORMAL MAN [INFLUENCE DES CHARACTERISTIQUES MECANIQUES THORACO-PULMONAIRES SUR LE REGIME VENTILATOIRE DE L'HOMME NORMAL].
M. Radermecker, J. Libon, and S. M. Petit (Liege U., Belgium).
Archives Internationales de Physiologie et de Biochimie, vol. 71, 1963, p. 323–350. 41 refs. In French.

In six adult human subjects, respiratory rate increased with ventilation and was progressively augmented after reinspiration of the expired air. Observed frequency values were significantly below those calculated on the basis of individual mechanical characteristics in relation to minimum work or minimum variation of intrathoracic pressure. Increases of dynamic or elastic resistances modified respiratory rate in reverse or leads to values below those predicted by mathematical models. Variations of partial oxygen pressure from 700 to 30 cm. Hg in the inspired air does not modify the respiratory rate-ventilation relationship. The causes of the observed discrepancies between the experimental and calculated respiratory rate are discussed within the context of problems of ventilatory regulation.

A64-80599
INVESTIGATIONS OF LONGITUDINAL SECTIONS FOR THE DIFFERENTIATION OF PROFESSIONAL AND NONPROFESSIONAL LOSSES OF HEARING THRESHOLDS IN NOISY INDUSTRIES [LANGSSCHNITTUNTERSUCHUNGEN ZUR DIFFERENZIERUNG PROFESSIONELLER UND AUSSERBERUFLICHER HORSCHWELLENVERLUSTE BEI ARBEITERN IN LARMBETRIEBEN].
W. Nesswetha (Vereinigte Glanzstoff-Fabriken, Medizinische Abteilung, Kelsterbach, Germany).
Arbeitsmedizin, vol. 1, Sep. 1963, p. 103–108. 10 refs. In German.

Extended audiometric examinations at invervals of 2, 6, and 10 years were carried out in a group of 550 subjects with occupational noise exposure. The initial ages ranged from 14.5 to 50 years. Causal differentiation of the average auditory losses sustained with increasing duration of noise exposure was attempted through a comparison of the audiometric statistics from this sample with the statistics collected from a homogenous group of 1321 individuals in occupations without special noise hazards. Of the auditory losses uncovered after two to six years only a small segment could be ascribed to occupational origin. Auditory losses covering several octaves became apparent only after ten years of occupational noise exposure. These results suggest the importance of noise exposure at home. Criteria are outlined for the evaluation of auditory susceptibility to noise and the audiometric control of exposed individuals.

A64-80600
PHYSIOLOGICAL ANALYSIS OF THE EFFECT OF PRECEDING MUSCULAR EFFORTS ON THE CAPACITY OF UNFATIGUED MUSCLES [FIZIOLOGICHNII ANALIZ VPLIVU POPEREDNIKH M'IAZOVIKH ZUSIL' NA PRATSEZDATNIST' NESTOMLENIKH M'IAZIV].
I. V. Muravov and F. T. Tkachov (Acad. of Med. Sciences, Inst. of Gerontol. and Exptl. Pathol., Kiev, USSR).
Fiziologichnii Zhurnal, vol. 10, 1964, p. 163–170. 18 refs. In Ukrainian.

The capacity of the flexor muscles of the right forearm as affected by preceding work of the symmetrical muscles of the left arm in young (14-26 years) and old (60–79 years) subjects was investigated, using the ergographic method. The effect of preceding work on the capacity of the unfatigued muscles in both young and old subjects depends on the intensity of the previous activity. In young subjects, muscle capacity is reduced by about 15%; in old persons, by about 35%. The relationship of these findings to Sechenov's phenomenon is discussed.

A64-80601
RECOVERY TIME AFTER GLARE: AN EXPERIMENTAL INVESTIGATION OF GLARE AFTER-EFFECT UNDER NIGHT DRIVING CONDITIONS.
Gunnar Johansson and Chris Ottander (Uppsala U., Dept. of Psychol., Sweden).
Scandinavian Journal of Psychology, vol. 5, 1964, p. 17–25.
Swedish State Traffic Safety Board-supported research.

Preliminary experiments suggest that the changes in adaptation level due to glaring light in a night traffic meeting situation give no practically important deterioration of visibility. To obtain a more complete answer, one experiment was done in a "real" night driving situation, and two experiments were carried out using a glare simulator, aimed at quantifying the change in the level of adaptation in terms of redetection time of a target made invisible due to glare. The effect of three factors were studied: duration of glare, maximum illuminance of glare, and contrast ratio between background and target. The preliminary suggestions were fully confirmed.

A64-80602
TECHNICAL AND BIOLOGICAL PROBLEMS OF MANNED SPACE FLIGHT [TECHNISCHE UND BIOLOGISCHE PROBLEME DES BEMANNTEN WELTRAUMFLUGES].
Theo Ginsburg (Tech. Inst., Trondheim, Norway).
Naturwissenschaftliche Rundschau, vol. 17, May 1964, p. 175–182. In German.

Technological and biological problems of manned space flight are reviewed together with descriptions of the Mercury project, Gemini project, and the projected Apollo moon expedition. An opinion is expressed that the technological problems of manned space flight will be solved within this decade, while biological and psychological problems imposed by weightlessness and cosmic radiation are as yet difficult to assess. According to Russian scientists a four-day space flight has no detrimental effects, allowing space flights to the moon. A growth effect noted in onion shoots suggests possibilities of similar acceleration of cellular growth in man. Cosmic radiation and radiation belts are not considered to be as dangerous as sun flares with tremendous bursts of radiation. However, recent astrophysical developments make it possible to predict such flares in advance for optimal scheduling of space flights.

A64-80603
COLOR VERSUS SHAPE CODING IN INFORMATION DISPLAYS.
Sidney L. Smith and Donald W. Thomas (Mitre Corp., Bedford, Mass.)
Journal of Applied Psychology, vol. 48, Jun. 1964, p. 137–146. 14 refs.
Contract AF 19(628)-2390.

Eight subjects counted objects of a specified color or shape on displays of 20, 60, or 100 items. Counting time and errors increased with increasing display density. Counting based on a 5-valued color code was faster and more accurate than counting using any of three shape codes. Color counting was not affected by the particular shape code on which the colors were superimposed. Shape counting was somewhat faster and/or more accurate when color did not vary on the display, and vice versa. Differences in counting performance appeared among the three shape codes and among certain of the symbols within shape codes, and small differences were confirmed among the particular code colors used.

A64-80604
SENSORY FEEDBACK ANALYSIS OF STEREOTELEVISION PURSUIT TRACKING.
John D. Gould and Karl U. Smith (Wisconsin U., Madison).
Journal of Applied Psychology, vol. 48, Jun. 1964, p. 152–160.
NSF and NIMH-supported research.

A stereotelevision system, capable of presenting binocular cues for remote depth perception, has been developed for research on problems of optical design and for sensory feedback studied in space science. Preliminary experiments evaluated a color-separation system, which was found to be faulty for research. Detailed visual acuity and stereoscopic acuity tests with a binocular-separation system disclosed that a very adequate and reliable three-dimensional system can be devised for laboratory studies of remote binocular vision. A specific experiment tested the utility of a nondirectional auditory cue in aiding visual pursuit tracking in depth. Results indicated that the effectiveness of the auditory cue varies as a function of the speed of the target course.

A64-80605
ASSISTED RESPIRATION IN AIR EVACUATION.
D. J. Waller (RCAF Station, Vancouver, British Columbia).
Medical Services Journal Canada, vol. 20, Jan. 1964, p. 25–42.

The experience of transporting by air 24 seriously sick or injured patients with moderate to severe hypoventilation on intermittent positive pressure breathing is described. Three case reports are given in detail. Modifications to respiratory equipment designed by an officer of the Canadian Forces Medical Service are also described: the "Bird Respirator", a lightweight (43 lb.), portable, high-capacity piece of equipment; a respirator involving the elimination of dead space; and a stretcher attachment.

A64-80606
EFFECT OF PRELIMINARY INJECTIONS OF ACTH AND ATP ON HEXOKINASE ACTIVITY OF SKELETAL MUSCLES AND HEART IN HYPOXIA.
V. V. Postupaev (I. P. Pavlov First State Medical School, Dept. of Biochemistry, Leningrad, USSR).
(Voprosy Meditsinskoi Khimii, vol. 9, 1963, p. 380.)
Federation Proceedings, vol. 23, May–June 1964.
(Translation Supplement), p. T501–T502. 17 refs. Translation.

Hexokinase activity is reduced in skeletal muscle and heart of rats subjected once to the action of reduced atmospheric pressure. Repeated daily injection of 2 units of ACTH or ATP in amounts of 7.5 mg. per kg. of body weight for 6 days does not change the hexokinase activity in skeletal muscle and heart. Repeated preliminary injections of ACTH or ATP prevent the decrease in hexokinase activity in skeletal muscle and heart caused by a deficiency of oxygen in the organism.

A64-80607
THE EFFECT OF TOTAL FASTING ON THYROID FUNCTION IN MAN.
W. D. Alexander, M. T. Harrison, R. M. Harden, and D. A. Koutras (Glasgow U., Dept. of Med., Gardiner Inst., Western Infirmary, Great Britain).
Metabolism, vol. 13, Jul. 1964, p. 587–590. 13 refs.
Medical Research Council and the Secretary of State for Scotland grants.

Serial studies of iodine metabolism were carried out in 8 obese patients before and during total deprivation of food. Evidence of decreasing thyroid function was suggested by a fall in uptake of both radioactive and stable iodine by the gland and by a fall in serum protein-bound iodine. The renal clearance and urinary excretion of iodine also fell. The amount of thyroid hormone deiodinated was calculated as 45.5 and 39.5 μg. of hormonal iodine daily.

A64-80608
PROBLEMS OF DESIGN AND ECOLOGICAL CONSIDERATIONS IN MASS CULTURE OF ALGAE.
A. M. Mayer, U. Zuri, Y. Shain, and H. Ginzburg (Hebrew U., Botany Dept., Jerusalem, Israel).
Biotechnology and Bioengineering, vol. 6, Jun. 1964, p. 173–190. 20 refs.
Contract AF 61(052)-546.

A mass culture of algae was operated with continuous stirring, as an open system. The system behaved as an ecological unit selecting the most favored species. The ecological conditions could be modified by stirring speed and pattern in the tank. Methods for improving yields and utilization of CO_2 are described. Assessment of algal species for suitability in mass cultures is discussed. Yields obtained were 13 g. dry matter/sq. m. illuminated area/day.

A64-80609
HUMAN PERFORMANCE AND SHORT TERM FOOD DEPRIVATION.
R. A. Champion and R. K. Field (Sydney U., New South Wales, Australia).
Australian Journal of Psychology, vol. 15, Dec. 1963, p. 187–190. 7 refs.

At the same time of day, groups of 15 subjects were given 40 simple reaction-time trials (pressing of a button in response to an auditory signal), 0, 5, and 10 hours after eating. The 10-hour group performed significantly worse than the 0-hour group early in testing, but there were no significant differences late in testing. The 5-hour and 10-hour groups, but not the 0-hour group, showed significant improvement in the course of testing. Examination of the asymptotes of exponential curves fitted to the data suggested that the 5-hour group would have shown the lowest mean reaction time had testing been prolonged.

A64-80610
THE CANTERBURY SOUND-PROOF ROOM.
M. Rodda, D. O. Watson, and G. D. Wilson (Canterbury U., Christchurch, New Zealand).
Australian Journal of Psychology, vol. 15, Dec. 1963, p. 206–210.

The room described was carefully designed to provide maximum attenuation and absorption in the middle (speech) frequency range. The construction was based upon the principles outlined by Richardson (1945). It has a mean ambient noise level of 29.9 db. on the A-weighting of a Dawe 1400 E sound level meter. The theoretical reverberation time of the room is 0.76 secs. The authors suggest that any further reduction in the noise level would be unwarranted because of sensory deprivation effects.

A64-80611
EFFECT OF HYPERCAPNIA ON RETINAL VESSEL SIZE AT CONSTANT INTRACRANIAL PRESSURE.
H. F. Spalter, R. E. Teneick, and G. G. Nahas (Columbia U., Coll. of Physicians and Surgeons, Depts. of Opthalmol. and Anesthesiology, Morningside Heights, N.Y.)
American Journal of Ophthalmology, vol. 57, May 1964, p. 741–745.
13 refs.
Grants NIH-H-4859-C2; NIH-NB-04140-01.

The relationship between carbon dioxide retention and retinal vasodilatation was investigated as well as the relationship between intracranial hypertension and retinal vasodilatation in the presence of hypercapnia. Adult mongrel dogs were used as subjects. It was demonstrated that hypercapnia produces a clinically observable retinal vasodilatation. It would appear that the rise in cerebrospinal fluid pressure contributes little to this dilatation. It is concluded that: (1) the retinal vascular changes observed clinically in patients with carbon dioxide retention are conditioned to a greater extent by elevated pCO_2 than by the increased cerebrospinal fluid pressure, and (2) photographic studies are a useful tool in the investigation of the effects of the blood gases on the retinal circulation.

A64-80612
RELATION BETWEEN ACCIDENT INCIDENCE AND TYPE AND LEVEL OF JOBS.
Eric P. Sanders (California U., Berkeley).
Psychological Reports, vol. 14, Jun. 1964, p. 670.

The study is based on a sampling of 597 hospital employees. A total of 46 positions were under investigation classified in terms of Roe's system. Results indicate that hazard exposure varies with job levels in that a greater accident rate was observed in lower than in higher level jobs. Within a given job level there are no significant differences in accident rate.

A64-80613
EFFECTS OF VARIATION IN VISUAL AND AUDITORY STIMULATION ON GASTROINTESTINAL MOTILITY.
Robert M. Stern (Indiana U., Indianapolis).
Psychological Reports, vol. 14, Jun. 1964, p. 799–802. 6 refs.
Contract No. DA-49-193-MD2063.

The purpose of this experiment was to investigate the effects of three different stimulus conditions on gastrointestinal motility as measured by electrodes on the surface of the abdomen. The 16 subjects were each run for two 40-min. sessions, during which they were instructed to lie quietly on a cot. Amplitude differentiated between a group that received diffuse stimulation and groups that received normal stimulation and no stimulation, with the former showing greater activity throughout the session. The increase in gastrointestinal activity for subjects in the diffuse stimulus group is attributed to the novelty and ambiguity of the stimulus situation.

A64-80614
COSMIC RADIATION AND TUBERCULOSIS. V. INFLUENCE OF COSMIC RADIATION ON TUBERCULOSIS AT HIGH ALTITUDE (2,300 m) AND AT SEA-LEVEL.
S. G. Ong (Acad. of Med. Sci., Inst. of Epidem. and Microbiol., Peking, People's Rep. of China).
Scientia Sinica, vol. 13, Feb. 1964, p. 241–258.

Tuberculous mice exposed to cosmic radiation at 2,300 meters showed a significantly greater mean survival time and a significantly greater number of survivors than those exposed to cosmic radiation at sea level. At high altitude as well as at sea level the female showed a significantly greater mean survival time than the male. The mean survival time of the male or female at high altitude is significantly greater than that of the male or female at sea level. At high altitude there is no significant difference in mortality between male and female. At sea level the female showed a significantly greater number of survivors than the male. The pooled data showed a significantly greater number of survivors of the female. At high altitude as well as at sea level the lung lesions diminished, whereas the spleen lesions increased significantly with increasing survival time.

A64-80615
COSMIC RADIATION AND TUBERCULOSIS. VI. IMMUNIZING PROPERTY OF TUBERCLE BACILLI EXPOSED TO COSMIC RADIATION.
S. G. Ong (Acad. of Med. Sci., Inst. of Epidem. and Microbiol., Peking, People's Rep. of China).
Scientia Sinica, vol. 13, Feb. 1964, p. 259–261.

Tubercle bacilli exposed to cosmic radiation with 2.1, 7.4, and 9.5 cm. Pb not only showed a strong attenuated virulence, but also possessed a strong immunizing property against reinfection with virulent tubercle bacilli. The attenuation of the virulence and the immunizing property of tubercle bacilli placed under 9.5 cm. of lead are superior to those tubercle bacilli placed under 2.1 cm. and 7.4 cm. of lead. These data were obtained by comparing the mortality curves for mice injected with tubercle bacilli exposed to cosmic radiation with lead screens with those for mice injected with tubercle bacilli exposed to direct cosmic radiation. The weight of mice injected with tubercle exposed to cosmic radiation under 9.5 cm. is significantly higher than that of any other group. It is suggested that a vaccine against tuberculosis could be obtained by repeated exposures of tubercle bacilli under 9.5 cm. Pb.

A64-80616
COSMIC RADIATION AND TUBERCULOSIS. VII. ACTION OF COSMIC RADIATION ON TUBERCLE BACILLI AT 2,300 m AND AT SEA-LEVEL.
S. G. Ong (Acad. of Med. Sci., Inst. of Epidem. and Microbiol., Peking, People's Rep. of China).
Scientia Sinica, vol. 13, Feb. 1964, p 263–267.

Tubercle bacilli exposed to direct cosmic radiation for 104 days at 2,300 meters showed a significantly lower virulence than those exposed to direct cosmic radiation at sea level. The virulence of tubercle bacilli exposed to cosmic radiation under 2 cm. and 10 cm. Pb at 2,300 meters is not constant. In mice, after reinoculation with original culture, there is a marked decrease of virulence. In the first experiment the female showed a significantly greater mean survival time than the male. In the second experiment there was no significant difference between the means of male and female, but there was an appreciable interaction between sex and treatment.

A64-80617
THE EFFECT OF INSTRUCTION ON THE APPEARANCE OF THE AUTOKINETIC EFFECT.
Joseph Cautela and Francis Vitro (Boston Coll., Dept. of Psychol., Chestnut Hill, Mass.)
Journal of Psychology, vol. 58, Jul. 1954, p. 85–88. 10 refs.

Four groups of 25 subjects each received instructions varied in suggestiveness regarding the autokinetic effect (AE). The results show that suggestion has a definite effect on the occurrence of AE. Belief that the light is going to do something increases the perception of AE. AE is not readily perceived by most subjects when movement is not suggested, and by some subjects even when movement is suggested. These findings are at variance with the hypothesis that a lack of adequate visual frame gives rise to the autokinetic effect.

A64-80618
VIGILANCE IN COMPLEX TASK SITUATIONS.
Glenn R. Hawkes, Thomas W. Meighan, and Earl A. Alluisi (U.S. Army Med. Res. and Develop. Command; Lockheed-Georgia Co., Marietta; and Louisville U., Ky.)
Journal of Psychology, vol. 58, Jul. 1964, p. 223–236. 15 refs.

An investigation of performance efficiency in several watchkeeping tasks was made with use of a task program encompassing various levels of task demand and several different kinds of activity. The additional tasks involved mental arithmetic, group coordination and cooperation, and form perception systematically presented during selected portions of the task program. The results indicated statistically different watchkeeping performances as a function of the level of task demand. Efficiency was highest when the task demand was low (and stimulus input was also relatively low), next most efficient with medium-level demand, and least efficient with high-level task demand. The addition of electrical cutaneous stimulation as partially redundant information in a monitoring task: (a) improved performance in that task, (b) served to maintain efficiency in spite of variations in the level of task demand, and (c) did not interfere with performance efficiency on other (concurrent) tasks. It is concluded that arousal theory is not a good predictor of watchkeeping performance in the kind of situation studied and may apply only in "stimulus-deprived" conditions.

A64-80619
ATTENTION, VIGILANCE, AND CORTICAL EVOKED-POTENTIALS IN HUMANS.
Manfred Haider, Paul Spong, and Donald B. Lindsley (California U., Dept. of Psychol., Los Angeles).
Science, vol. 145, Jul. 1964, p. 180–182. 6 refs.
Contracts No. DA-49-007-MD-722; and Nonr-233-(32).

Computer-averaged potentials evoked from the cortex were recorded to nonsignal stimuli and to randomly interspersed signal stimuli requiring detection and response during prolonged visual vigilance. As detection efficiency diminished over time, the amplitude of evoked responses to nonsignal stimuli decreased and latency increased. Fluctuations in vigilance (attentiveness) during the course of the task also were accompanied by corresponding changes in evoked-potentials to nonsignal stimuli. More specific lapses of attention, revealed by detection failures, resulted in average evoked-responses of lower amplitude to missed as compared with detected signals.

A64-80620
PRIMARY, SECONDARY, AND CALORIC NYSTAGMUS OF THE CAT FOLLOWING HABITUATION TO ROTATION.
William E. Collins (Federal Aviation Agency, Civil Aeromed. Res. Inst., Oklahoma City, Okla.)
Journal of Comparative and Physiological Psychology, vol. 57, Jun. 1964, p. 417–421. 10 refs.

Ten cats were exposed to a series of threshold accelerations and subthreshold decelerations. Unilateral caloric irrigations, provoking nystagmus in the same direction as threshold rotational stimuli, preceded and followed the set of accelerations. A marked nystagmus response decline, characterized by specific changes in early trials, resulted from repeated rotation. Although neither duration nor total slow-phase eye displacement to caloric stimulation was affected, the intervening rotational experience produced some reduction in the frequency of the nystagmic beats. Secondary nystagmus activity appeared closely related to preceding primary reactions. Caloric responses to vestibular stimulation may not give an accurate indication of a subject's state of adaptation to "practiced" levels of angular acceleration.

A64-80621
ENHANCEMENT OF EVOKED CORTICAL POTENTIALS IN HUMANS RELATED TO A TASK REQUIRING A DECISION.
Hallowell Davis (Central Inst. for the Deaf, St. Louis, Mo.)
Science, vol. 145, Jul. 1964, p. 182–183. 8 refs.
Grant PHS-G-NB-03856-02.

The averaged, slow response evoked by auditory stimuli and recorded from the vertex of the human skull can usually be enhanced by requiring the listener to make a rather difficult auditory discrimination. An easy routine reaction is not effective.

A64-80622
MECHANISM OF VISUAL AUTOKINESIS.
F. J. Verheijen and H. Oosting (Utrecht U., Lab. of Comp. Physiol., Zonnenburg, Netherlands).
Nature, vol. 202, Jun. 6, 1964, p. 979–981. refs.

The hypothesis that the eye should move in a direction opposite to that in which the fixation light appeared to move during the previous autokinetic illusion is investigated in two series of experiments. In 11 subjects (2 female, 9 male), each eye was tested separately. Results of the first series of experiments can be summarized as follows: (1) the significant mean directions of autokinesis were all upward (17 eyes); (2) in 11 eyes the movement in darkness was in a direction opposite ($180^{o} \pm 60^{o}$) to that of the preceding autokinesis (8 eyes $P \leq 0.05$; 3 eyes $P > 0.05$); (3) in 9 eyes the movement in darkness was in a direction identical ($0^{o} \pm 60^{o}$) to that of the preceding autokinesis (7 eyes $P \leq 0.05$; 2 eyes $P > 0.05$); (4) only in 2 eyes did both directions seem to be independent of each other ($P > 0.05$) and (5) in 6 eyes out of 8 mentioned under (2) with $P \leq 0.05$, the mean direction of the eye movement in the dark was in a direction opposite to that of autokinesis for this eye. The most important results in the second series was that both eyes of one subject that had moved in the direction of the previous autokinesis in the first series now moved in the opposite direction ($P \leq 0.05$) of the mean direction of autokinesis. Results in (2) and (5) are consistent with the oculomuscular theory of autokinesis stating that variations in the efficiency of the extraocular muscles produce the illusion. Explanations of the other findings are attempted as the latter related to results of other investigators.

A64-80623
DISTANCE PERCEPTION IN DARKNESS.
Linda G. Bilderback, Robert E. Taylor, and Donald H. Thor (Georgia U., Dept. of Psychol., Athens).
Science, vol. 145, Jul. 17, 1964, p. 294–295.
Human subjects viewed round stimuli located equidistantly in the horizontal and vertical planes of vision under conditions where presumed cues to size were present and where they were systematically eliminated (artificially induced "moon illusions"). Two experiments revealed a consistent tendency for the horizon object to be judged the closer. Cues introduced reduced the effect.

A64-80624
PHYSIOLOGIC RESPONSE TO INCREASED OXYGEN PARTIAL PRESSURE. II. RESPIRATORY STUDIES.
William G. Robertson, John J. Hargreaves, James E. Herlocher, and B. E. Welch (USAF School of Aerospace Med., Bioastronautics Dept., Environ. Systems Branch, Brooks AFB, Tex.)
Aerospace Medicine, vol. 35, Jul. 1964, p. 618–622. 16 refs.
NASA Order R-89; NASA Order T-16758-G.
The respiratory effects of a 30-day exposure to an alveolar partial pressure of 171 mm. Hg have been studied in 4 subjects at a total pressure of 700 mm. Hg (33.3 percent O_2) and 4 subjects at 258 mm. Hg (100 percent O_2). Vital capacities decreased on ascent to the 258 mm. Hg pressure altitude and returned to normal immediately upon descent to ground level. Maximum breathing capacities increase concomitantly. No changes were seen in the 700 mm. Hg exposure. There was no evidence of changes in the oxygen carrying capacity of the blood. The lack of any persistent, unaccountable effects of an alveolar partial pressure of 171 mm. Hg in the presence or absence of nitrogen indicates that as far as pulmonary function is concerned, man appears to be able to tolerate either environment equally well.

A64-80625
PHYSIOLOGIC RESPONSE TO INCREASED OXYGEN PARTIAL PRESSURE. III. HEMATOPOIESIS.
Ralph Zalusky (USAF School of Aerospace Med., Bionucleonics Dept., Appl. Radiobiol. Branch, Brooks AFB, Tex.), Frode Ulvedal, James E. Herlocher, and B. E. Welch (USAF School of Aerospace Med., Bioastronautics Dept., Environ. Systems Branch, Brooks AFB, Tex.)
Aerospace Medicine, vol. 35, Jul. 1964, p. 622–626. 22 refs.
NASA Order R-89, NASA Order T-16758-G.
The influence of increased partial pressure of oxygen on hematopoiesis was studied in 8 normal subjects: 4 subjects were exposed to a total pressure of 700 mm. Hg, 33 percent O_2 and 62.3 percent N_2; and 4 subjects to a total pressure of 258 mm. Hg, 98.5 percent O_2 and 0.2 percent N_2. Two control subjects remained outside the chamber during each 30-day study. Measurements were designed to determine whether the increased arterial P_{O_2} (177.7mm. Hg in the 700 mm. Hg group, and 169.7 mm. Hg in the 258 mm. Hg group) affected circulating red blood cells and/or red blood cell production. Except for mild changes in red cell values with hematocrit reduction of 6.7 percent and 9.1 percent in the 700 mm. Hg group and 258 mm. Hg group, respectively, most of the hematopoietic studies were normal. It appears that 30-day exposure to the increased oxygen partial pressures used in this study does not significantly alter hematopoiesis.

A64-80626
A SIMPLE METHOD OF CHORIORETINAL BURN PROTECTION.
Howard A. Minners and Norris L. Newton (USAF School of Aerospace Med., Aerospace Med. Div., Brooks AFB, Tex.)
Aerospace Medicine, vol. 35, Jul. 1964, p. 627–629. 7 refs.
If miosis of 2.25 mm. or less pupillary diameter is employed for retinal thermal protection, the results obtained indicate, with a reasonably high level of statistical confidence, that: (1) A pilot's visual acuity is adequate to perform instrument readings under the minimum instrument illumination in current aircraft. (2) Ciliary spasm secondary to pilocarpine miosis is not a major problem as measured by distance acuity and near point of accommodation measurements. Only one subject in the eliminated group was noted to have ciliary spasm after one hour and 30 minutes. (3) It can be shown, based on the laws of optics, that miosis limits the quantity of light entering the eye and is therefore equivalent to relatively dense neutral filters. Thus, miosis should afford chorioretinal thermal protection. Before either drug or artificial miosis can be recommended for field use, several other aspects of this approach must be investigated.

A64-80627
PHYSIOLOGIC RESPONSE TO INCREASED OXYGEN PARTIAL PRESSURE. I. CLINICAL OBSERVATIONS.
James E. Herlocher, David G. Quigley, Victor S. Behar, E. G. Shaw, and B. E. Welch (USAF School of Aerospace Med., Bioastronautics Dept., Environ. Systems Branch, Brooks AFB, Tex.)
Aerospace Medicine, vol. 35, Jul. 1964, p. 613–618. 12 refs.
NASA Orders R-89; T-16758-G.
Eight healthy, young airmen were experimental subjects in 2 space cabin simulator experiments. Two other healthy volunteers served as outside controls for each experiment. Experiment 63-3 had an average total pressure (P_T) of 700 mm. Hg with an oxygen partial pressure (P_{O_2}) of 233 mm. Hg and a nitrogen partial pressure (P_{N_2}) of 436 mm. Hg. Experiment 63-4 had an average P_T of 258 mm. Hg with a P_{O_2} of 254 mm. Hg and an average P_{N_2} of 0.5 mm. Hg. The atmosphere was well-tolerated by the young subjects who demonstrated very few of the previously described symptoms of oxygen toxicity. The aural atelectasis and nasal congestion were bothersome but did not interfere with mission completion. This was the only area where the presence or absence of nitrogen made a noticeable difference. Dark adaptation studies and renal function measurements failed to outline any decrease in function, either at 700 mm. Hg or 258 mm. Hg. The use of a single gas, 258 mm. Hg P_T atmosphere seems to be feasible for periods up to 30 days without any impairment of man's ability to carry out his duties and without creating any physiologic decrement.

A64-80628
EFFECTS OF SOME TRANQUILIZING, ANALEPTIC AND VASODILATING DRUGS ON PHYSICAL WORK CAPACITY AND ORTHOSTATIC TOLERANCE.
R. V. Ganslen, B. Balke, F. J. Nagle, and E. E. Phillips (Civil Aeromed. Res. Inst., Biodynamics Branch, Oklahoma City, Okla.)
Aerospace Medicine, vol. 35, Jul. 1964, p. 630–633. 13 refs.
Using standardized tests on the treadmill and on the tilt table the effects of the following analeptic and tranquilizing drugs on physical working capacity and on orthostatic tolerance were investigated: Caffeine-Metrazol—A combination of this drug (in combined dosages of 0.1 g or 0.2 g each) appeared to have potency as antifatiguing medication and ergogenic aid, accomplishing an improvement in cardiac economy by increasing the stroke volume at a lowered heart rate and augmenting maximum cardiac output as well as maximum oxygen intake. Recordil (Flavon-7-ethyl-oxyacetate)—The physical working capacity of the subjects was materially benefited by a dose of 200 mg. of this drug taken 4 hours before the exercise test. The absence of localized fatigue and leg pain supports the thesis that peripheral vasodilatation is present and effective. The psychic-excitatory effect of Recordil could not be explained except on the basis of some conceivable increased cerebral blood flow mechanism for which there is no evidence at this time. Equanil—One must not associate disinclination to exertion (a common effect of meprobamates) with potential working capacity of the individual. Although the latter was actually not altered even under massive doses of Equanil, disturbances of the vasomotor system became evident. A real hazard seemed to exist with the tendency of blood pressures to be depressed, particularly with subjects who naturally possessed low blood pressure. These vasomotor disturbances suggested central nervous system depression, especially of thalamic origin.

A64-80629
LACK OF PREDICTABILITY IN RATS TO EXHIBIT CHRONIC OXYGEN POISONING.
George H. Kydd, Leonard Kowalski, and Richard Mc Gowan (US Naval Air Develop. Center, Aviation Med. Acceleration Lab., Johnsville, Pa.)
Aerospace Medicine, vol. 35, Jul. 1964, p. 634–636. 12 refs.
Sprague-Dawley descended rats were repeatedly exposed to oxygen at high pressure. Chronic oxygen toxicity was obtained in one group of animals while in two other groups no permanent paralysis was obtained. By far the most serious danger to these animals from the standpoint of survival were signs attributable to the respiratory system. It is suggested that a third factor, perhaps environmental, may have a role in predisposing rats to the development of the chronic signs of oxygen toxicity. The relationship of chronic to acute signs is discussed.

A64-80630
THE EFFECT OF DECREASED BAROMETRIC PRESSURE ON MAXIMUM PRESSURE-VOLUME RELATIONSHIPS OF THE HUMAN RESPIRATORY SYSTEM.
Louis F. Johnson, Jr. (USAF School of Aerospace Medicine, Aerospace Medical Div., Brooks AFB, Tex.)
Aerospace Medicine, vol. 35, Jul. 1964, p. 637–642. 8 refs.
Maximum pressure-volume relationships of the respiratory system at 30,000-feet pressure altitude were measured on five human test subjects and compared with those taken at ground level. To avoid hypoxia at this altitude, it was necessary to breathe 100% oxygen. To have the same breathing mixture throughout the tests, 100% oxygen was also breathed at ground level. At both 30,000 feet and ground level, measurements were made at initial lung volumes of 100%, 80%, 60%, 40%, 20%, and 0% vital capacity. No effect of altitude on expiratory pressure exerted from a given starting lung volume was observed. Although the maximum expiratory pressures that could be exerted from a given starting lung volume were the same at 30,000 feet as those at ground level, the final lung volumes after exerting these pressures were markedly less at 30,000 feet. This lung volume change at 30,000 feet emphasizes the significant altitude effect resulting from decreased gas density.

A64-80631
THE EFFECTS OF "FOHN" WEATHER ON ACCIDENT RATES IN THE CITY OF ZURICH (SWITZERLAND).
Walter S. Moos (Illinois U., Coll. of Med., Dept. of Radiol., Chicago).
Aerospace Medicine, vol. 35, Jul. 1964, p. 643–645. 20 refs.

Possible time correlation between Föhn (dry, warm southerly wind of some Alpine regions in Europe) weather and accidents was investigated. Föhn data were obtained from the Swiss Meteorological Central Institute in Zürich. Compilation and hourly breakdown of accidents occurring during 1958 through 1961 were provided by the Metropolitan Police, City of Zürich. Accident data were reduced into 4 hour periods up to 8 hours after the officially reported start or termination of the Föhn incident. During the Föhn itself, the data seem to point toward greater accident proneness but not on a statistical basis except for the year 1961 and the summary values of all four years.

A64-80632
CARDIOVASCULAR DECONDITIONING DURING CHAIR REST.
Lawrence E. Lamb, Robert L. Johnson, and Paul M. Stevens (USAF School of Aerospace Med., Aerospace Med. Div., Dept. of Internal Med., Brooks AFB, Tex.)
Aerospace Medicine, vol. 35, Jul. 1964, p. 646–649.

Six healthy subjects were studied in a simple, uncomplicated experiment using strict chair rest with immobilization as a means of achieving physical inactivity. The normal bed rest period for sleep was permitted for each 24-hour period. All six subjects had normal orthostatic tolerance by routine tilt table studies prior to the inactivity. Five of the six subjects showed manifestations of orthostatic intolerance after approximately four days of the experiment. The manifestations ranged from dizziness to fainting and circulatory collapse. Nausea and vomiting were also seen. This study demonstrates that simple physical inactivity of sufficient degree over a short period of time, uncomplicated by the problems of weightlessness or simulated weightlessness, will cause adverse changes in circulatory dynamics leading to syncopal reactions or circulatory collapse.

A64-80633
NON-ESTERIFIED FATTY ACIDS IN VENOUS BLOOD UNDER DIFFERENT EXPERIMENTAL CONDITIONS.
F. Vogt Lorentzen (Royal Norwegian Air Force, Inst. of Aviation Medicine, Oslo, Norway).
Aerospace Medicine, vol. 35, Jul. 1964, p. 649–652. 9 refs.

Nonesterified fatty acids (NEFA) were determined under and after the following conditions: exercise to exhaustion on untrained and trained subjects, standardized moderate exercise, hypoxia (20,000 feet), exercise plus hypoxia, hypercapnia, hypocapnia, alkalosis, breathing pure oxygen. Some typical changes are described. Great variations in the normals and many irregular curves with peaks and dips were found. It is doubted that NEFA in blood can be a reliable measure of the fatty acid metabolism.

A64-80634
VIEWER REACTIONS TO ABSTRACT VISUAL FORMS.
J. J. Dreher and W. E. Evans (Lockheed-California Co., Burbank).
Aerospace Medicine, vol. 35, Jul. 1964, p. 653–657. 10 refs.

Studies are presented requiring forced choice reaction by subjects to adjectives (dangerous, pleasant, safe, fast, comfortable, luxurious) and various forms (triangle, semicircle, circle, curve, cruciform, sweptwing). These were used because of their basic application to a wide variety of situations in somewhat the same sense that the cruciforms and sweptwing figures were selected because of their relation to pictorial aspects of some space vehicles. Each figure was presented individually as a test item with the six descriptive adjectives laid out laterally to the right. Subjects were required to make two indications: (1) which of the six adjectives best described the test item, and (2) which of them least described it. Comparison of the test items by both orientation and common feature were made to determine their connotative aspects. There was remarkable agreement among the 52 test subjects on the most connotative descriptions, but considerably less on the least connotative descriptions.

A64-80635
GRAVITATIONAL STRESS AND EQUILIBRATION.
Ulf Brandt (Royal Swedish Air Force, Med. Unit, Stockholm; and Karolinska Inst., Lab. of Aviation Med., Stockholm, Sweden).
Aerospace Medicine, vol. 35, Jul. 1964, p. 657–661. 10 refs.

Two groups of experiments are presented investigating: (1) orientation to gravity following gravitational stress, and (2) reorientation to resultant force following gravitational stress. Results indicate that even if strong g stress (leading to unconsciousness and, hence, heavily influencing the psychic function, among its close effects) may give rise to subjective experiences of a change in position in space, the concept of horizontality will actually remain unimpaired. A similar g stress in its nearby effects does not influence the capacity of reorientation as expressed by a rapidly induced oculogravic phenomenon.

A64-80636
EFFECTS OF WHOLE-BODY VIBRATION OF HUMANS ON PLASMA AND URINARY CORTICOSTEROID LEVELS.
Renato Litta-Modignani, Ben B. Blivaiss, Edward B. Magid, and Inna Priede (Chicago Med. School, Dept. of Physiol., Ill.)
Aerospace Medicine, vol. 35, Jul. 1964, p. 662–667. 43 refs.
Contract No. AF 33(616)-6889.

The effects on the hypophysioadrenal and hypophysiothyroid systems of whole body vibration of the human for 9 minutes at 1–20 c.p.s. were assessed through the determination of plasma 17-hydroxycorticosteroids (17-OH-CS) and protein-bound iodine (PBI) and of urinary adrenal cortex steroids. Subjects were exposed to three vibrations of 3-minute duration separated by 3-minute rest periods. Blood and urine samples were collected at corresponding times on the control day and on the experiment day. Plasma 17-OH-CS levels were lower than control values ($P < 0.05$) immediately after vibration at 5, 6, and 7 c.p.s. and at 5 hours after vibration ($P < 0.01$). There was a significant decrease in the urine excretion of the blue tetrazolium reducing steroids at 1, 2, and 3 c.p.s., and in 17-ketogenic steroids at 18, 19, and 20 c.p.s. At 5, 6 and 7 c.p.s. there were significant changes in all steroids studied. Serum protein-bound iodine showed no significant differences when compared to control day. Alterations in blood and urine levels of steroids, while of statistical significance, are still considered within normal limits. Whether longer time exposure to vibration may produce changes to abnormal levels requires further investigation.

A64-80637
INFLIGHT TOXIC REACTIONS RESULTING FROM FLUOROCARBON RESIN PYROLYSIS.
James B. Nuttall, Roy J. Kelly, Billy S. Smith, and Clarence K. Whiteside, Jr. (USAF School of Aerospace Med., Brooks AFB, Tex.)
Aerospace Medicine, vol. 35, Jul. 1964, p. 676–683. 6 refs.

An inflight toxic hazard incident in a C-54 aircraft caused toxic reactions in 39 of the 40 personnel on board including passengers and aircrew. Six of these were incapacitated and three required postflight hospitalization. The source and identity of the toxic agent were not readily apparent. Postflight investigation revealed the toxic reaction pattern to be typical of metal or polymer fume fever. Although the source of the toxic substance was proved to be fumes from the auxiliary power unit, the identification of actual agent was difficult. A laboratory test situation utilizing the offending power unit resulted in the determination that the pyrolysis products from Teflon impregnated asbestos tape wrappings on the exhaust manifold of the power unit were the cause of the toxic reactions. The asbestos tape involved was erroneously substituted for nonresin containing tape.

A64-80638
MAN IN ORBIT.
Bernard Kovit.
Space/Aeronautics, vol. 41, Jun. 1964, p. 76–83.

An analysis is presented of the problem of man's adaptation to the conditions of space flight. If man is allowed to adapt to the conditions of space flight, i.e., weightlessness, etc., it is possible that he will not be able, without great difficulty, to return to the conditions on Earth. If man becomes adapted to weightlessness, the effect on the cardiovascular system, skeletal system, orientation and the vestibular apparatus, muscular system, and respiratory physiology may be to so change him that upon return to Earth there will be serious counter effects. Loss of calcium from the bones, labyrinth reactions, and muscular atrophy are indications that it may be better to supply the astronaut with artificial gravity. Adaptation and effects resulting from heat, sensory deprivation, isolation, and confinement are also discussed.

A64-80639
USE OF RADIOTELEMETRY IN SPACE MEDICINE [PRIMENENIE RADIOTELEMETRII V KOSMICHESKOI MEDITSINE].
I. T. Akulinichev and R. M. Baevskii.
Vestnik Akademii Meditsinskikh Nauk SSSR, vol. 2, 1964, p. 60–66. In Russian.

Latest experiments in space medicine are reviewed in the light of modern space communication techniques. Future developments and perfection of these tests are discussed. The following Soviet studies and achievements are mentioned: electrodes which can remain fixed for 3 to 5 days on the spaceman's body without impeding his activity or irritating him, thus providing a quality electrocardiographic record; a simultaneous monitoring of two parameters over a single telemetric channel; the development, adjustment, and refinement of compact, multichannel, highly sensitive and dependable telemetric bio- and physiological testing equipment. The Vostok-3 and Vostok-4 cockpit physiological equipment are specified in minute detail; samples of Nikolayev's test data are given, and suggestions are made for data processing techniques.

A64-80640
FUNCTIONAL PROCESSES UNDER THE EFFECTS OF EMOTIONAL STRESSES [FUNKTIONSABLAUFE UNTER EMOTIONELLEN BELASTUNGEN].
(Symposium, II. Medizinische Universitätsklinik, Wien, May 24–25, 1963.)

Edited by K. Fellinger.
Basel, S. Karger, 1964, 204 p. In German. $8.05.

Psychophysiological research elucidating the interrelationships between emotions and bodily functions is reviewed with emphasis on developments in biochemistry, psychopharmacology, and psychosomatic disorder. Pertinent papers are abstracted separately.

A64-80641
INVESTIGATION OF CIRCULATION OF STUDENTS SUBJECTED TO EMOTIONAL STRESSES (KREISLAUFUNTERSUCHUNGEN AN STUDENTEN UNTER EMOTIONELLEN BELASTUNGEN).
E. Wick (Justus-Liebig-U., Med. Poliklinik, Giessen, Germany).
IN: FUNKTIONSABLAUFE UNTER EMOTIONELLEN BELASTUNGEN.
Edited by K. Fellinger.
Basel, S. Karger, 1964, p. 94–102. 6 refs. In German.

Continuous registration of blood pressure and pulse rate was carried out in ten medical students taking their oral board examinations. Six students already had increased blood pressures at the beginning of the experiment. Six of the subjects reacted with an increase in blood pressure and pulse rate to the entrance of the examiner. All subjects reacted with rise of systolic and diastolic blood pressures to the examiner's questions. With two exceptions, pulse rate also increased at such times. Average increases were 30 mm. Hg for the systolic pressure, and 25 mm. Hg for the diastolic pressure. Average increase in pulse rate was 16 beats per minute. The changes observed in these indices were not clearly related nor in the same direction. Subjective impressions of feelings toward the examination and cardiovascular reactivity are analyzed for two of the subjects.

A64-80642
INTERACTION OF FORWARD AND BACKWARD MASKING.
Irwin Pollack (Mich., U., Mental Health Research Inst., Ann Arbor).
Journal of Auditory Research, vol. 4, Jan. 1964, p. 63–67.

The interaction of the "forward masking" produced by a burst of noise upon a brief tone following the noise, with the "backward masking" produced by a following noise burst was examined. Within the conditions tested, the combination of equally effective forward and backward masking conditions produced from 7 to 22 decibels additional masking relative to the components. The effectiveness of forward masking and of backward masking were largely independent each of the other.

A64-80643
THE GASEOUS REQUIREMENTS (RESPIRATION).
Edwin Hendler (U.S. Naval Air Engr. Center, Aerospace Crew Equipment Lab., Philadelphia, Pa.)
IN: PHYSIOLOGICAL PROBLEMS OF SPACE EXPLORATION.
Edited by James D. Hardy.
Springfield, Ill., Charles C Thomas, 1964, p. 100–133. 50 refs.

The integrity of man's physiological state during all phases of space flight depends directly upon the adequacy of the gaseous environment with which he is surrounded. The physiological effects of excesses and deficiencies in the environmental constituents of oxygen, carbon dioxide, nitrogen, toxic substances, and air ions are discussed. The effects of total pressure levels and changes in pressure are related to structural and functional changes in body organs and systems. Consideration of these factors is important in determining the gaseous environment of man in space.

A64-80644
FOOD REQUIREMENTS IN SPACE.
John R. Brobeck (Pa. U. School of Med., Philadelphia).
IN: PHYSIOLOGICAL PROBLEMS OF SPACE EXPLORATION.
Edited by James D. Hardy.
Springfield, Ill., Charles C Thomas, 1964, p. 134–151. 30 refs.

Biochemical nutritional needs, feeding behavior, and the influence of food intake upon behavior are reviewed as they relate to food for space missions. Food requirements and food-water relations as well as acceptability of foods (for both short flights and long flights) are included. Perhaps the most striking effect of food upon behavior is its sedative action. A second important point is that food sometimes cannot be used as a tranquilizer because the gastrointestinal tract will not accept or retain it. Third, the reward value of food as used widely in psychology should not be overlooked. Finally, one must consider the opposite of the sedative effect of food, namely, the stimulant effect of fasting. These observations suggest the following conclusions: (1) irritability and possibly activity can be decreased by feeding; (2) overfeeding is to be avoided; (3) appetite is an adequate guide in short-term exposures (up to a few days); and (4) when appetite fails and food is not desired during an interval of longer than a few days, the situation justifies a thorough study from both a psychological and a physiological point of view. In other words, the food (and water) intake must be considered as a critical factor in assuring both the "habitability" of any spacecraft and the performance of its crew. The accumulation of more technical information about feeding men in space is desired.

A64-80645
WEIGHTLESSNESS AND SUB-GRAVITY PROBLEMS.
James D. Hardy (Yale U. School of Med., New Haven, Conn.)
IN: PHYSIOLOGICAL PROBLEMS IN SPACE EXPLORATION.
Edited by James D. Hardy.
Springfield, Ill., Charles C Thomas, 1964, p. 196–208. 7 refs.

There appear to be few instances in which physiologic function is truly gravity-dependent. The stresses of gravity contribute to backache, flat feet, varicose veins, and bed sores. Also, the vascular system of the body is sufficiently marginal in some of its functions so that prolonged sitting may result in swollen feet and rigid standing may cause fainting. With proper exercise routines there seems to be little reason to feel that the astronaut will be in danger from weightlessness per se. The physiological systems likely to be affected by weightlessness include the musculoskeletal and cardiovascular systems and the equilibrium senses. Inactivity on the part of the astronaut must be avoided and space for exercising within the spacecraft must be provided. From time to time during a prolonged space flight, some form of artificial gravity will have to be provided to keep the spacecraft orderly. Following the launch accelerations for a lunar mission, the crew must pass into weightlessness. Changes from acceleration to weightlessness may be more disturbing than continued weightlessness. Additional information in this area is needed from spaceflights of prolonged duration.

A64-80646
SENSORY AND PERCEPTUAL PROBLEMS IN SPACE FLIGHT.
John Lott Brown (Pa. U., School of Med., Philadelphia).
IN: PHYSIOLOGICAL PROBLEMS IN SPACE EXPLORATION.
Edited by James D. Hardy.
Springfield, Ill., Charles C Thomas, 1964, p. 209–230. 51 refs.
PHS Award No. GM-K3-15277-C2.

Sensory and performance capabilities of man are discussed in relation to tasks he might perform during spaceflight. Vision (the principal available receptor in space in the absence of a sound-transmitting atmosphere) and its many applications are reviewed with respect to the various stages of space missions, i.e., launch, orbit, lunar and interplanetary flight, and landing. Hazards to vision, including high illumination levels, ionizing radiation, exotic fuels, and acceleration are discussed. Hearing and its hazards, and problems with regard to other senses (vestibular, kinesthetic, tactual, olfactory, gustatory) are also discussed. Discussions of other problems, e.g., time perception and sensory deprivation are included.

A64-80647
ISOLATION AND DISORIENTATION.
Randall M. Chambers (U.S. Naval Air Development Center, Aviation Med. Acceleration Lab., Human Factors Div., Johnsville, Pa.)
IN: PHYSIOLOGICAL PROBLEMS IN SPACE EXPLORATION.
Edited by James D. Hardy.
Springfield, Ill., Charles C Thomas, 1964, p. 231–297. 124 refs.

This chapter reviews and summarizes research on isolation and disorientation as they relate to problems encountered during space flight. Isolation refers to conditions which separate a person from significant parts of his environment, while terms such as confinement, sensory deprivation, sensory input overload, and earth separation are used to categorize specific isolation problems. Disorientation refers to a number of psychophysiological conditions during which a person's perceived sensations and frames of reference are at variance with reality in terms of time, position, location, motion or acceleration. The importance of selection, training, and human engineering in preparing man to sustain illusion and other disorientation, as well as the effects of prolonged isolation and confinement, are discussed.

A64-80648
HIGH ENERGY RADIATIONS.
Carl C. Clark (Martin Co., Life Sci. Dept., Baltimore, Md.)
IN: PHYSIOLOGICAL PROBLEMS IN SPACE EXPLORATION.
Edited by James D. Hardy.
Springfield, Ill., Charles C Thomas, 1964, p. 47–99. 55 refs.

A review is presented of (1) problems of radiation measurement and terminology; (2) the physical characteristics of the various types of high energy radiations; (3) the energy spectra, component radiation, and time variations of the natural and manmade radiation sources of concern to a space traveler (e.g., galactic cosmic rays, solar cosmic rays, magnetosphere radiation belts, nuclear power, induced radioactivity, residual radioactivity, radionuclides and electronics as high energy radiation sources); (4) the biological effects of these radiations; and (5) means of protection against them.

A64-80649
TEMPORARY HEARING LOSSES FOLLOWING EXPOSURE TO PRONOUNCED SINGLE-FREQUENCY COMPONENTS IN BROAD-BAND NOISE.
Alexander Cohen and Karl C. Baumann (Public Health Serv., Div. of Occupational Health, Cincinnati, Ohio).
Journal of the Acoustical Society of America, vol. 36, Jun. 1964, p. 1167–1175. 17 refs.

Temporary hearing losses were obtained for exposures to a noise field containing strong single frequencies whose strength was independently varied while holding the overall exposure level constant. Depending upon their frequency and prominence level, strong pure tones in noise caused greater losses than those due to equivalent exposures to a continuous spectrum noise. These pure-tone-exposure conditions were identified as being more hazardous to hearing by the U.S. Air Force 160-3 Noise Regulation, but so were others where no such evidence existed. The findings were interpreted in terms of the action of the acoustic reflex that has been proposed to account for the ability of pure tones and noise to cause hearing loss.

A64-80650
CHANGES IN DIFFERENTIAL LEUKOCYTE COUNT IN PROLONGED TOTAL ALIMENTARY STARVATION.
Yu. L. Shapiro (Acad. of Med. Sci., Inst. of Psychiat., Moscow, USSR).
(Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia, vol. 7, 1963, p. 39).
Federation Proceedings, vol. 23, May–Jun. 1964 (Translation Supplement), p. T447–T449. 17 refs. Translation.

A tendency toward leukopenia is detected in man during prolonged total alimentary starvation. The more protracted the starvation, the greater the leukopenia. At advanced stages of starvation (13th-40th day) the leukopenia is chiefly at the expense of the polymorphonuclear leukocytes and lymphocytes (absolute numbers). The shift of the neutrophils to the left is degenerative in nature. In the bone marrow the process of neutrophil differentiation is relatively well preserved, but the intensity of the proliferative processes decreases. A definite parallel is observed between the wavelike changes in the absolute eosinophil and lymphocyte counts (decrease on the 1st–4th day of starvation, increase in the advanced stages—13th–40th day). The trend of the changes in the morphological composition of the peripheral blood and bone marrow suggests these changes to be adaptive in nature. Regenerative processes period appears 1.5–2.5 weeks after eating is resumed. The white blood cell levels become normal not later than 1.5–3.5 months after end of starvation.

A64-80651
EFFECT OF EXCLUSION OF LIGHT ON ELECTRICAL ACTIVITY IN CORTEX AND RETICULAR FORMATION OF RABBIT BRAIN.
L. A. Novikova and V. I. Beliaev (RSFSR Acad. of Pedagogic Sciences, Inst. of Defectology; and Moscow U., Dept. of Physiol. of Higher Nervous Activity, Moscow, USSR).
(Zhurnal Vysshei Nervnoi Deiatel'nosti imeni I. P. Pavlova, vol. 13, 1963, p. 715.)
Federation Proceedings, vol. 23, May–Jun. 1964, (Translation Supplement), p. T636–T640. 17 refs. Translation.

Functional exclusion of the visual analysor was followed within a day or two by reduction of EEG amplitude in the visual, parietal, and sensorimotor areas of the cortex. The basic cortical rhythm was slowed, and fast waves disappeared from the tracings. The total energy of the potentials in the visual and sensorimotor regions decreased 60%–90% in 1–2 months. When EEG amplitudes had fallen 30%–40%, the presence of excitation in the reticular formation was indicated by faster potentials, the development of 6–7/sec synchronized potentials. When excitation in the reticular formation was maximum, the decline in the amplitude of the cortical potentials ceased, or amplitudes were temporarily increased. No significant EEG changes were observed immediately after return to light in rabbits kept a long time in darkness. As exposure to ordinary light continued, however, potentials in the visual and sensorimotor regions of the cortex slowly and gradually increased in size and cortical activity became more rapid. Cortical response to flicker was poor during the first hours or days after the return to light. Thereafter, however, this reaction improved, and the range of effective frequencies increased with the size of the cortical potentials.

A64-80652
THE PATTERNS OF EXCRETION OF CATECHOLAMINES DURING DIFFERENT PHYSIOLOGICAL AND PATHO-PHYSIOLOGICAL CONDITIONS [AUSSCHEIDUNGSMUSTER VON KATECHOLAMINEN WAHREND VERSCHIEDENER PHYSIOLOGISCHER UND PATHOPHYSIOLOGISCHER ZUSTANDE].
U. S. von Euler (Karolinska Inst., Physiol. Abt., Stockholm, Sweden).
IN: FUNKTIONSABLAUFE UNTER EMOTIONELLEN BELASTUNGEN. Edited by K. Fellinger.
Basel, S. Karger, 1964, p. 5–13. 19 refs. In German.

Patterns of catecholamine excretion as an index of sympathetic-adrenal activity are discussed with respect to basal levels as influenced by diurnal rhythm, activity, body position, and emotional stress. Differential excretion of catecholamines is encountered in hypoglycemia, mental stress, acceleration, flying, manned spaceflight, and parachute jumps. Adrenalin infusion improved performance of some tasks and lowered it on others. Observations relate aggressivity to a heightened noradrenalin excretion and fear to higher adrenalin values.

A64-81653
THE EFFECTS OF EMOTIONAL STRESSES ON THE CIRCULATION IN THE HUMAN EXTREMITIES [DER EINFLUSS VON EMOTIONELLEN BELASTUNGEN AUF DIE DURCHBLUTUNG DER EXTREMITATEN DES MENSCHEN].
H. Konzett (Innsbruck U., Pharmakol. Inst., Austria).
IN: FUNKTIONSABLAUFE UNTER EMOTIONELLEN BELASTUNGEN. Edited by K. Fellinger
Basel, S. Karger, 1964, p. 64–86. 10 refs. In German.

Blood circulation of the arm and the calf was measured in 34 students during emotional stress imposed by a mental arithmetic task and the expectation of electric shock. Both types of stresses caused a considerable rise in blood volume circulated through both areas. After premedication with drugs affecting the central nervous system (phenobarbital, meprobamate, thioridazine, and chlordiazepoxide) emotional stress resulted in only a slight increase of blood circulation in individual subjects.

A64-80654
POLYGRAPHIC INVESTIGATIONS (EEG, EKG, RESPIRATION, OSCILLOGRAM, MYO-MECHANOGRAM, GALVANIC SKIN RESPONSE) UNDER THE INFLUENCE OF MUSIC AND OTHER AFFECTIVE STIMULI [POLYGRAPHISCHE UNTERSUCHUNGEN (EEG, EKG, ATMUNG, OSZILLOGRAMM, MYO-MECHANOGRAMM, GALVANISCHER HAUTREFLEX) UNTER DEM EINFLUSS VON MUSIK UND ANDEREN AFFEKTIVEN REIZEN].
G. Harrer and H. Harrer (Landesnervenklinik Salzburg, Austria).
IN: FUNKTIONSABLAUFE UNTER EMOTIONELLEN BELASTUNGEN. Edited by K. Fellinger.
Basel, S. Karger, 1964, p. 115–126. 20 refs. In German.

Polygraphic registration of electroencephalogram, electrocardiogram, pneumogram, oscillogram, myogram, and galvanic skin response was carried out during (a) listening to music, and (b) being startled by sudden noises. A marked difference was noted between analytic involvement with music and emotional involvement with music. In one individual the pulse rate rose suddenly from 72 to 124 beats per minute while listening to a specific piece. The electrocardiogram showed a flattening of the T-wave, respiratory changes, and oscillatory changes. Shift in attention was reflected by a block of the alpha wave on the electroencephalogram. Chlordiazepoxide (Librium) inhibited or suppressed these changes.

A64-80655
PERCEPTUAL SPEED IN RELATION TO QUANTA OF SIMULTANEOUSLY PRESENTED MATERIAL.
G. F. K. Naylor (Queensland U., St. Lucia, Brisbane, Australia).
Australian Journal of Psychology, vol. 15, Dec. 1963, p. 175–186.

An earlier study (Naylor, G. F. K., "Basic Speed Factors in Perception") is reviewed in an attempt to substitute a more meaningful equation for that previously suggested as expressing the times for perceiving n perceptual elements simultaneously presented (where n varies from one to five). A new equation $T = (1 + (n-1)K)^{n}P$ is shown to accord with the results of previous experiments in both visual and tactile media. The meaning of the constants p and K is discussed and the conditions under which p might vary in magnitude and sign are theoretically deduced. The hypotheses thus posed are tested experimentally and supported by the observed results obtained from a group of 45 subjects. In general, p, which expresses the degree of curvature of the graph of the equation, is found to relate to the basic nature of the perceptual task, while K, indicating the mean gradient, tends to relate to individual variation from subject to subject.

A64-80656
PERMANENT THRESHOLD SHIFT CHANGES PRODUCED BY NOISE EXPOSURE AND AGING.
Ronald Gallo and Aram Glorig (Subcommittee on Noise Research Center, Los Angeles, Calif.)
American Industrial Hygiene Association Journal, vol. 25, May–Jun. 1964, p. 237–245. 12 refs.
Grant NIH-G-OH-00085-07.

A study of audiometric data indicates that for long-term exposure to industrial noise of approximately 90 db octave-band SPL: (1) Most hearing level changes at 3000, 4000 and 6000 cps occur in the initial 15 years, whereas at 500, 1000, and 2000 cps, hearing level change is approximately linear with exposure time. (2) Large individual differences in the amount of hearing level change are evident; these differences increase with audiometric frequency. (3) Men have greater hearing level changes than women. (4) Hearing level changes produced by noise-exposure and by aging may not be differentiable.

A64-80657
ALTERED FUNCTION IN ANIMALS INHALING LOW CONCENTRATIONS OF OZONE AND NITROGEN DIOXIDE.
Sheldon D. Murphy, Charles E. Ulrich, Stanley H. Frankowitz, and Charles Xintaras (Public Health Service, Div. of Air Pollution, Lab. of Med. and Biol. Sciences, Cincinnati, Ohio).

American Industrial Hygiene Association Journal, vol. 25, May–Jun. 1964, p. 246–253. 20 refs.

Quantitative measurements of the respiratory function of guinea pigs were made before, during, and after exposure to low concentrations of ozone and nitrogen dioxide. The earliest effects detected during exposure to either of the gases were increased respiratory frequency and decreased tidal volume. These effects were noted during 2-hour exposures to concentrations of O_3 as low as 0.34 ppm or within 4 hours of exposure to NO_2 at a concentration of 5.2 ppm. Previous exposure to O_3 did not result in tolerance to the respiratory function changes produced during exposure to a 1.5-ppm concentration of the gas. Voluntary running activity of mice was depressed during exposure to concentrations of O_3 between 0.2 and 0.7 ppm and to NO_2 concentrations of 7.7 to 20.9 ppm.

A64-80658

CURRENT CONCEPTS OF THE MECHANISM OF OCCUPATIONAL HEARING LOSS.

Merle Lawrence (Mich. U., Inst. of Ind. Health and Dept. of Otorhinolaryngol., Ann Arbor).

American Industrial Hygiene Association Journal, vol. 25, May–Jun. 1964, p. 269–273.

Contract DA-49-007-MD-634.

Environmental sound exerts its effect upon those structures that are vibrated mechanically, and essentially, the damage that occurs as the result of vibrations of excessive amplitude depends upon the characteristics of the impinging sound and upon the condition of the aural structures. A blast may damage the middle-ear structures. The long-term, steady, load sounds more often encountered are more subtle in their effect and produce changes in the inner-ear structures. The process is purely a mechanical one and appears to have several stages, the extent of which depends considerably upon the state of the human organism at the time of insult.

A64-80659

ATRIAL FIBRILLATION IN FLYING PERSONNEL: REPORT OF 60 CASES.

Lawrence E. Lamb and Lawrence W. Pollard (USAF School of Aerospace Med., Aerospace Med. Div., Brooks AFB, Tex.)

Circulation, vol. 29, May 1964, p. 694–701. 12 refs.

Sixty cases of atrial fibrillation from the USAF flying population are reported. Followup information in 59 subjects averaged 41.2 months. Only three cases of persistent atrial fibrillation were detected and two of these had normal sinus rhythm prior to the onset of atrial fibrillation. There were 21 cases of recurrent paroxysmal atrial fibrillation and 36 cases of isolated acute atrial fibrillation associated with a variety of precipitating factors. Thyrotoxicosis was notable by its absence in any of these cases of atrial fibrillation. Symptomatology either related to the primary disorder precipitating atrial fibrillation or secondary to the arrhythmia itself was frequently observed. The hemodynamic effects of atrial fibrillation on cardiac output, and cerebral artery spasm with diminished cerebral blood flow are important aeromedical considerations.

A64-80660

MORTALITY FROM HEART DISEASE AT HIGH ALTITUDE.

William E. Morton, Donald J. Davids, and John A. Lichty(Colo. U. Med. School, Records and Statist. Sect. and Prevent. Med. Serv. Div., Denver).

Archives of Enviromental Health, vol. 9, Jul. 1964, p. 21–24. 20 refs.

Because of suggestions by practicing physicians in Peru and Colorado that fatal cases of coronary thrombosis and of hypertension were rare at higher elevations, Colorado mortality statistics for these causes for 1949–1951 and 1959–1961 were analyzed for variation by altitude. Altitude-associated variations in crude cause-specific mortality rates were eradicated by age-standardization of the rates, indicating that the apparent scarcity of fatal cases of arteriosclerotic heart disease and hypertension at high altitudes in Colorado is due to smaller proportions of older persons in the population. There is no increased mortality risk from these causes at higher elevations in Colorado despite the existence of altitude-induced erythremia.

A64-80661

OZONE IN HIGH-ALTITUDE AIRCRAFT CABINS.

L. S. Jaffe (Public Health Serv., Div. of Air Pollution, Wash., D.C.) and H. D. Estes.

Archives of Environmental Health, vol. 9, Jul. 1964, p. 61–71. 56 refs.

The exact cabin concentrations of ozone in various types of jet aircraft at different altitudes are being studied to determine whether an environmental problem exists, particularly for aircrews. High ambient ozone concentrations of 5–10 ppm are found at altitudes of 65,000–80,000 ft, through which the supersonic air transport (SST) will cruise. The air used for cabin pressurization passes through the compressors very quickly, too quickly to destroy all the ozone present by adiabatic heating. Unacceptable concentrations of ozone will be present in the cabin environment of the SST unless devices are employed, such as catalytic filters or engineering techniques, for delaying or increasing the dwell time of the ambient air intake through the compressors long enough for adiabatic heating to destroy or reduce the ozone content below 0.2–0.3 ppm. It is recommended that additional research be performed in the area of time–temperature relationships of air compressors of turbojet, turboramjet, and/or other proposed types of SST propulsion to develop adequate techniques of ozone destruction.

A64-80662

THE ALERTED EFFECTIVE THRESHOLD IN AN AUDITORY VIGILANCE TASK.

Charles F. Gettys (Louisville U., Ky.)

Journal of Auditory Research, vol. 4, Jan. 1964, p. 23–28. 20 refs.

US Army-supported research.

The effective difference limen intensity threshold for 24 subjects was determined by an ascending method of limits for alerted and unalerted signals in four conditions. The alerted effective threshold increased with time on task. It was suggested that the factor of temporal uncertainty did not influence the course of vigilance decrement, although a large and significant difference was found between alerted and unalerted thresholds. No significant differences were found between the alerted thresholds obtained when the subject was searching for unalerted signals and alerted thresholds obtained when the subject was told that he would be warned prior to the onset of each signal. This result tentatively suggests that the continuous search that is characteristic of most vigilance tasks is not a necessary condition for the vigilance decrement to occur. The increase with time on task of the unalerted effective threshold was consistent with the findings of the majority of other studies measuring the course of the effective difference limen threshold. No effect due to signal frequency was found.

A64-80663

PHYSIOLOGICAL PROBLEMS IN SPACE EXPLORATION.

Hardy, J. D., ed. (Yale U., Med. School, New Haven, Conn.)

Edited by James D. Hardy.

Springfield, Ill., Charles C Thomas, 1964, ix+333 p.

The thermal environment as related to the astronaut is examined together with descriptions of the physiological limitations of man and his temperature regulatory capacities. The following aspects of the thermal environment are included: (1) temperature variations on the earth, in space, the moon, and other planets; (2) heat transfer; (3) radiation of heat (optical properties of the skin, thermal characteristics of the skin, and effect of infrared radiation in evoking the sensation of warmth); (4) heat transfer by conduction; (5) heat transfer by convection; (6) forced convection; and (7) evaporation. Physiological limitation descriptions include discussions of steady-state and temporary heat loads. It appears that, with care, thermal loads in space near the earth and moon will be manageable by control of radiation exchanges. Heat acclimatization and training of the astronaut in a space chamber with the thermal characteristics of the space environment appear warranted.

A64-80664

RESPIRATORY ADAPTATIONS TO HIGH ALTITUDE AS RELATED TO AGE.

D. B. Dill, Berry L. Newton (Ind. U., Dept. of Anat. and Physiol., Bloomington), W. H. Forbes (Harvard School of Pub. Health Boston, Mass.), and James W. Terman (Ind. U. School of Med., Bloomington).

IN: RELATIONS OF DEVELOPMENT AND AGING: A Symposium Presented before the Gerontological Society at the 15th Annual Meeting, Miami Beach, Florida.

Edited by James E. Birren.

Springfield, Ill., Charles C Thomas, 1964, p. 62–73. 8 refs.

Contract FA-2049.

The adaptation of six men to high altitudes has been compared with their responses to altitude twenty-seven years ago. In this report special attention has been given to respiratory adaptations in rest and exercise. The respiratory minute volume in rest increases about as rapidly and to the same extent as in young men. Nevertheless, several of the six were slower to acclimatize than before as indicated by dyspnea on exertion, headache, Cheyne-Stokes breathing, and associated loss of sleep. In exercise easy work on the ergometer was performed with the same respiratory minute volume as in 1935. As the grade of work was increased the minute volume increased more than in 1935; the oxygen consumption in peak performance was much less than in 1935.

A64-80665

EXPLORATION OF THE MOON.

Franklyn M. Branley (Am. Museum, Hayden Planetarium, New York, N.Y.)

Garden City, New York, The Natural History Press, 1964, ix+127 p. $3.50.

This book is devoted to three major aspects of moon exploration: (1) the physical nature of the moon, its composition, surface conditions, and life supporting characteristics; (2) spaceflight to the moon, and the Apollo and Gemini Projects; and (3) the setting up of a colony on the moon. The purpose of establishing a moon colony and possible economic advantages are stated. Requirements for maintaining life such as living quarters, power sources, and air and water supplies are discussed. Various appendices give data on the moon, on other satellites in the solar system, on lunar space probes, etc.

A64-80666
ACCELERATION.
James D. Hardy (Yale U. School of Med., New Haven, Conn.)
IN: PHYSIOLOGICAL PROBLEMS IN SPACE EXPLORATION.
Edited by James D. Hardy.
Springfield, Ill., Charles C Thomas, 1964, p. 152–195. 8 refs.

Two major problem areas, tolerance to acceleration and ability to perform in acceleration environments, are of major importance from the point of view of aerospace physiology. The two areas are discussed as they relate to the following types of acceleration: (1) vibration and oscillation (continued periodic forces of various magnitudes, directions, and frequencies); (2) impact (suddenly applied linear forces and torques of relatively large magnitude, g 30, acting for times shorter than 1.0 sec are usually involved); (3) sustained linear and angular accelerations (forces acting for times longer than 1 sec); and (4) weightlessness and subgravity (applied to those environments of magnitudes less than 1 g). Studies investigating man's tolerance to these stresses and means of coping with them are presented. The use of simulators in the testing and training of astronauts for various space programs is discussed.

A64-80667
PHYSIOLOGIC RHYTHMS.
Franz Halberg (Minn. U., Med. School, Minneapolis).
IN: PHYSIOLOGICAL PROBLEMS IN SPACE EXPLORATION.
Edited by James D. Hardy.
Springfield, Ill., Charles C Thomas, 1964, p. 298–322. 27 refs.
Grants No. NSG-517; PHS-G-5-K6-GM-13,981, PHS-G-NB-04531-02, PHS-G-C-4359 C4; Am. Cancer Soc. G-E-155-E; Elsa U. Pardee Foundation; and Minn., Dept. of Public Welfare Supported research.

Circadian (about 24-hour) rhythms are discussed with respect to: (1) scope, generality, and reproducibility; (2) deviations from an exact 24-hour period; (3) synchronizer schedule; (4) hormone effects in the light of circadian system analysis; and (5) resistance to injury. Circadian functional integration and adaptation provide but one component to the broad spectrum of physiological frequencies. This component and others may be quantified and visualized by variance spectra. Man's exploration of extraterrestrial space has raised or renewed his interest in circadian rhythms. Whether astronauts (a) can perform optimally on a non-24-hour work-rest cycle, (b) presumably without a 24-hourly periodic geophysical and/or other environmental input, constitutes an applied problem. Information from submarines or simulated space flights is relevant to (a) but not necessarily to (b). Problems of physiologic rhythms thus are pertinent to human engineering for life in aerospace, particularly with respect to astronaut selection and performance.

A64-80668
EFFECT OF REPEATED EXPOSURE TO HIGH-INTENSITY SOUND.
W. D. Riach, D. N. Elliott, and L. Frazier (Wayne State U., Dept. of Psychol., Auditory Res. Lab., Detroit, Mich.)
Journal of the Acoustical Society of America, vol. 36, Jun. 1964, p. 1195–1198.

Auditory fatigue was experimentally induced in eight subjects over a period of several weeks so that a systematic study could be made of the alteration in hearing which might occur as a result of such repeated exposures. Temporary threshold shifts (TTS) and intensity-difference thresholds (IDT) were obtained from each of these subjects as indices of fatigue. In general, there were only chance variations in the TTS and the IDT over the period studied. It was concluded that within the limits of this study, repeatedly exposing subjects does not basically alter the hearing mechanisms. However, as the sessions progressed, a trend toward a smaller TTS at the 1-minute postexposure point was noted. This change resulted in an accentuation of the "bounce" phenomenon, which did not disappear when the contralateral ear, not previously exposed, was fatigued. Thus, the data suggest that the change in the R-1 recovery function was the result of a factor common to both ears.

A64-80669
PHYSIOLOGICAL STUDY OF A SONIC EJECTION HAVING CAUSED HEAVY INJURIES [ETUDE PHYSIOLOGIQUE D'UNE EJECTION SONIQUE AYANT ENTRAINE DES LESIONS GRAVES].
Bourret, A. Salvagniac, J. Fabre, and J. Divine.
Revue des corps de santé des armées terre mer air, vol. 4, Oct. 1963, p. 577–588. 21 refs. In French.

A double ejection at 0.35 Mach is reported with the French E.96 and E.97 ejection seats where the subjects (pilot and navigator) survived after sustaining severe injuries. The ejections were carried out at 10,000 and 15,000 feet. The pilot's main injuries included severe dislocation of both knees and right arm, and petechias of the face, neck, arms, etc. The navigator sustained dislocation of the right elbow, fracture of the femur, and subcapital fracture of the left humerus. Although the mechanical apparatus of the seats functioned adequately, it is recommended that they be modified to include leg and arm restraints in order to prevent injuries to these areas.

A64-80670
IMMUNIZING POWERS IN EXPERIMENTAL BENZOLE POISONING. III. CHANGES OF THE COMPLEMENTARY POWER OF THE SERUM AFTER ACTIVE IMMUNIZATION POTERI IMMUNITARI NELL'INTOSSICAZIONE SPERIMENTALE DA BENZOLO. NOTA III. VARIAZIONI DEL POTERE COMPLEMENTARE DEL SIERO DOPO IMMUNIZZAZIONE ATTIVA].
R. Raddi, V. D'Angelo, and V. Giuliani (Firenze U., Ist. di Med. del Lavoro, Italy).
Lavoro umano, vol. 16, Jan. 1964, p. 29–32. 10 refs. In Italian.

Rabbits were injected subcutaneously with pure benzol (0.5 cc. per kilogram of body weight) on alternate days for 40 consecutive days. On the 5th, 10th, 20th, 25th, 30th, and 35th days after initiation of benzol poisoning the animals received intravenously human strain of antityphoid vaccine. In control animals there was a discrete increase in the complemental power of the serum following vaccine stimulation. In benzol-poisoned animals titers of serum complemental power decreased in a progressive manner in comparison with initial base values. These results demonstrate that benzol has a marked inhibiting effect on both tissue and humoral factors responsible for body immunization.

A64-80671
IMMUNIZING POWERS IN EXPERIMENTAL BENZOLISM. IV. TITER OF THE ANTI-TYPHUS ANTIBODIES DURING SPECIFIC ACTIVE IMMUNIZATION [POTERI IMMUNITARI NELL'INTOSSICAZIONE SPERIMENTALE DA BENZOLO. NOTA IV. TITOLO DEGLI ANTICORPI ANTITIFICI IN CORSO DI IMMUNIZZAZIONE ATTIVA SPECIFICA].
V. D'Angelo, R. Raddi, and R. Belli (Firenze U., Ist. di Medicina del Lavoro, Italy).
Lavoro umano, vol. 16, Jan. 1964, p. 33–36. In Italian.

Rabbits were subcutaneously injected with pure benzol (0.5 cc. per kilogram of body weight) on alternate days for 40 consecutive days. On the 5th, 10th, 15th, 20th, 25th, 30th, and 35th days after initiation of poisoning the animals received intravenously antityphoid vaccine (human strain). In the control animals vaccine stimulation produced a high antibody titer, both for somatic and ciliary antigens. In benzol-poisoned animals the immune response was practically absent. In an advanced period of immunization there appeared to be a slight agglutination, entirely of the ciliary type. Values for this agglutination considered in relation to those from controls were not significant in regard to an effective immune response.

A64-80672
PRIMATE RETINAL RESPONSES: SLOW CHANGES DURING REPETITIVE STIMULATION WITH LIGHT.
P. Gouras and R. E. Carr (Natl. Inst. of Neurol. Diseases and Blindness, Ophthalmol. Branch, Bethesda, Md.)
Science, vol. 145, Jul. 24, 1964, p. 413–414. 5 refs.

Sudden, repetitive illumination (610 millimicra) of the dark-adapted monkey eye produces transient changes in the electroretinogram and transocular potential that can last an hour or longer.

A64-80673
SUBJECTIVE EVALUATION OF DISCOMFORT CAUSED BY FLIGHT NOISE [ÉVALUATION SUBJECTIVE DE LA GENE PROVOQUEE PAR DES BRUITS D'AVIONS].
E. Perret, E. Grandjean, and A. Lauber (Ecole Polytech. Fédérale, Inst. d'Hyg. et de Physiol. du Travail, Zurich, Switzerland; and Inst. de Rech., Lab. Fédéral d'Essai des Materiaux, Zurich, Switzerland).
Travail Humain, vol. 27, Jan.–Jun. 1964, p. 53–62. 5 refs. In French.

Students listening to 128 airplane noises recorded on magnetic tape during 18 periods gave a score between 1 and 6 after each noise according to their subjective evaluation of the discomfort they experienced. Variables in the airplane noises used gave the following results: (1) discomfort increased almost linearly with sound level expressed in decibels or in perceived noise levels for the two sound spectra studied (DC-8 and Caravelle aircraft); (2) discomfort increased with duration of noises; (3) for identical noise levels, the acoustical spectrum with high pitch predominance (Caravelle's landing) led to greater discomfort than the spectrum with low pitch predominance (takeoff of DC-8); (4) discomfort was the same during periods with 5 or 6 airplane noises as during periods with 10 or 11 noises; and (5) repetition of the same noises led to a low but significant decrease in the discomfort experienced.

A64-80674
A METHOD OF CONTINUOUS REGISTRATION OF ACTION POTENTIALS AND ACTION-POTENTIAL FREQUENCIES BY MEANS OF A DIRECT MECHANICAL RECORDING SYSTEM [EINE METHODE ZUR FORTLAUFENDEN REGISTRIERUNG VON AKTIONSPOTENTIALEN UND AKTIONSPOTENTIAL-FREQUENZEN MIT MECHANISCHEN DIREKTSCHREIBSYSTEMEN].
H. P. Koepchen and L. Heinich (Göttingen U., Physiol. Inst., West Germany).
Pflügers Archiv für die gesamte Physiologie, vol. 280, Jun. 9, 1964, p. 92–98. In German.

A method is described that allows the continuous registration of the activity and discharge frequency of single or several neuronal units over long periods, using electromechanical direct writing systems. The method is particularly useful for the synchronous recording of nervous activity together with slowly fluctuating biological variables, such as temperature, blood pressure, respiration, etc. Two records are shown as samples of possible applications of the method.

A64-80675
STARVATION, SLEEP DEPRIVATION, AND THE STRESS RESPONSIVE INDOLE SUBSTANCE.
Arnold J. Mandell, Edward J. Kollar, and I. Mersol Sabbot (U.C.L.A. Center for the Health Sci., Los Angeles, Calif.)
IN: RECENT ADVANCES IN BIOLOGICAL PSYCHIATRY, VOL. VI: THE PROCEEDINGS OF THE EIGHTEENTH ANNUAL CONVENTION AND SCIENTIFIC PROGRAM OF THE SOCIETY OF BIOLOGICAL PSYCHIATRY, ATLANTIC CITY, N. J., Jun. 7–9, 1963.
Edited by Joseph Wortis.
New York, Plenum Press, 1964, p. 96–104. 28 refs.
Grant CDMH-G-61-2-22.

Paid male volunteers were subjected to a starvation period of four days for two subjects and seven days for three subjects, and to a sleep-deprivation period of five days for two subjects. One subject of each group was given 60 units of adrenocorticotropin after a period of deprivation to get an idea of the 17-hydroxycorticosteroid and indole response range. With the exception of a brief elevation due to an upset and the elevation associated with ACTH injection there was no significant change in the basal diurnal rhythm of 17-hydroxycorticosteroid excretion during four to seven days of starvation. However, a stress responsive indole substance (SRIS) appeared in the urine after two days and remained present for the duration of the study. 17-hydroxycorticosteroids increased in both subjects following the first night of sleep loss. SRIS appeared after 36 hours of sleep deprivation following a biphasic course. The role of vitamin deficiency and activity levels in the metabolic and 17-hydroxycorticosteroid changes under both stress conditions is discussed. Of interest is the appearance of SRIS in association with adrenal corticosteroid activating as well as nonactivating stress situations. It is suggested that this substance may be N-substituted tryptamine.

A64-80676
SIGNIFICANCE OF SYMPTOMS OF SENSORY DEPRIVATION EXPERIMENTS DUE TO METHODOLOGICAL PROCEDURES.
Eugene Ziskind (Southern Calif. School of Med., Los Angeles).
IN: RECENT ADVANCES IN BIOLOGICAL PSYCHIATRY, VOL. VI: THE PROCEEDINGS OF THE EIGHTEENTH ANNUAL CONVENTION AND SCIENTIFIC PROGRAM OF THE SOCIETY OF BIOLOGICAL PSYCHIATRY, ATLANTIC CITY, N. J., Jun. 7–9, 1963.
Edited by Joseph Wortis.
New York, Plenum Press, 1964, p. 111–118. 22 refs.

Forty-five binocularly patched subjects described what they saw in a ten-minute period of observation of their visual fields. Sixteen different subjects reported their first imagery on awakening in the morning. The directions to both sets of subjects were varied in degree from those most to those least structured. Different subjects were used for concurrent and retrospective reporting. Incidence of imagery was greatest for the most structured situations and lowest for the least structured situations, both for eye-patched tests and for the arousal dream studies. With intermediate latitudes in instructions, the incidence of imagery fell between these extremes. However, 25% reported imagery without prior instructions but with questioning. The less structured of eye-patched subjects showed a tendency to complex imagery. The authors conclude that a methodological artifact (direction rather than suggestion) was responsible for highlighting normal imagery in sensory deprivation experiments, which otherwise goes unnoticed.

A64-80677
SOCIAL ISOLATION AND SOCIAL INTERACTION: A BEHAVIORAL AND PHYSIOLOGICAL COMPARISON.
David Shapiro (Harvard Med. School, Boston, Mass.), P. Herbert Leiderman (Stanford U. School of Med., Palo Alto, Calif.), and Mona E. Morningstar (Mass. U., Amherst).
IN: RECENT ADVANCES IN BIOLOGICAL PSYCHIATRY, VOL. VI: THE PROCEEDINGS OF THE EIGHTEENTH ANNUAL CONVENTION AND SCIENTIFIC PROGRAM OF THE SOCIETY OF BIOLOGICAL PSYCHIATRY, ATLANTIC CITY, N.J., Jun. 7–9, 1963.
Edited by Joseph Wortis.
New York, Plenum Press, 1964, p. 129–138. 17 refs.
Contract No. Nonr-1866(43); Grant No. NIMH-G-4209; and Award No. NIMH-M-2276.

Eighty-four women performed a game under conditions of social isolation and social interaction in a three-person group. The number and variability of initiations were greater for individuals in the isolation than in the group condition. The level of galvanic skin potential was higher and the heart rate tended to be lower under conditions of group interaction. Levels of initiations and galvanic skin potential were consistent for individuals relative to one another when the group situation preceded the alone situation. Individual differences in heart-rate level and galvanic skin potential variability were consistent regardless of the temporal order of isolation and interaction experiences. The social condition can set behavioral and physiological norms which carry over into a subsequent experience. Some measures are sensitive to the social conditions and the order in which they occur, while others appear to reflect relatively stable characteristics of the individual.

A64-80678
THE INTERACTION OF LSD AND SENSORY DEPRIVATION: PHYSIOLOGICAL CONSIDERATIONS.
Sidney Cohen and Allen E. Edwards (Wadsworth V. A. Hosp., Los Angeles, Calif.)
IN: RECENT ADVANCES IN BIOLOGICAL PSYCHIATRY, VOL. VI: THE PROCEEDINGS OF THE EIGHTEENTH ANNUAL CONVENTION AND SCIENTIFIC PROGRAM OF THE SOCIETY OF BIOLOGICAL PSYCHIATRY, ATLANTIC CITY, N.J., Jun. 7–9, 1963.
Edited by Joseph Wortis.
New York, Plenum Press, 1964, p. 139–144. 8 refs.

Ten healthy volunteers were studied at weekly intervals under each of four conditions: (1) lysergic acid diethylamide (LSD) plus sensory normalcy (SN), (2) LSD plus sensory deprivation (SD), (3) placebo plus SN, and (4) placebo plus SD. Physiological measures monitored continuously were: heart rate, respiratory rate, plethysmogram, skin resistance, and electroencephalogram (EEG). In verbal reports six out of ten subjects who had received LSD thought they had received placebo, but reported onset of the LSD effects shortly after termination of two hours of SD. Heart rate and skin resistance registered under the LSD-SN condition differed significantly from the other three conditions. Vasoconstriction under both LSD conditions was significantly different from placebo conditions. EEG differences apparently depended on the sensory state of the subject. The delay in the onset of LSD effect is explained on the basis of reduced sensory input in the SD condition which does not offer many sense data for distortion.

A64-80679
VISUAL HALLUCINATIONS DURING SENSORY DEPRIVATION: A PROBLEM OF CRITERIA.
Peter Suedfeld and Jack Vernon (Princeton U., Dept. of Psychol., N.J.)
Science, vol. 145, Jul. 24, 1964, p. 412–413. 5 refs.
Grant No. DA-49-007-MD-671; and Grant No. NSF-G-21762.

Studies of hallucinations conducted at the sensory deprivation laboratories of Princeton University are reviewed with the aim of identifying hallucinogenic factors. Reported visual sensations before being classified as hallucinations had to meet criteria of (1) uncontrollability of onset, content, and termination; (2) "out-thereness"; (3) scannability; and (4) apparent reality. None of the manipulations of implicated factors succeeded in eliciting visual hallucinations from a significant proportion of the subjects. Adoption of a standard set of criteria is urged before classifying reported visual sensations in sensory deprivation research as hallucinations.

A64-80680
A HISTORY OF THE CENTRIFUGE IN AEROSPACE MEDICINE.
William J. White (Douglas Aircraft Co., Inc., Missile and Space Systems Div., Santa Monica, Calif.)
Santa Monica, California, Douglas Aircraft Co., Inc., 1964, 90 p.

A historical account is presented of the use of the human centrifuge in aerospace medicine. The use of the centrifuge in the late 18th and early 19th centuries as a clinical tool for treating insanity with acceleration is recorded, and a description of these early machines is given. Research stimulated by the introduction of the airplane in World War I is reported, and the important work done in each major country is cited. From 1930 to 1940 intensive studies began in earnest on the effect of acceleration on flying personnel, and many of the significant studies are briefly reported. Further developments of the centrifuge brought about in conjunction with World War II are cited. From 1950 to 1960 there were 14 new human centrifuges put into operation throughout the world. This period is marked by the addition of an enclosed gondola for studying altitude and heat stress along with acceleration. The characteristics and uses of these newer installations are given. Future plans in the United States are discussed in relation to the new Dynamic Escape Simulator at Wright Field, and NASA's Flight Acceleration Facility in Texas.

A64-80681
VESTIBULAR NUCLEI: ACTIVITY OF SINGLE NEURONS DURING NATURAL SLEEP AND WAKEFULNESS.
Emilio Bizzi, Ottavio Pompeiano, and Istyan Somogyi (Univ. di Pisa, Ist. di Fisiol.; and Consiglio Naz. delle Ricerche, Centro di Neurofisiol. and Gruppo d'Elettrofisiol., Italy).
Science, vol. 145, Jul. 24, 1964, p. 414–415. 8 refs.
Grant No. PHS-G-NB-02990-02.

The rate of spontaneous discharge of second-order vestibular neurons is higher during wakefulness than during drowsiness and synchronized sleep. The activity of units recorded from the lateral (and superior) vestibular nucleus remains unmodified or is slightly increased during desynchronized sleep, in spite of the complete disappearance of the postural tonus. Units in

medial and descending vestibular nuclei show bursts of rapid discharge associated with the eye movements characteristic of desynchronized sleep.

A64-80682
LAND USE PLANNING WITH RESPECT TO AIRCRAFT NOISE: DISCUSSION OF A NEW PROCEDURE.
Elizabeth Guild, John N. Cole, Henning E. von Gierke, William J. Galloway, and Adone C. Pietrasanta (Aerospace Med. Res. Labs., Biodyn. and Bionics Div., Wright-Patterson AFB, Ohio; and Bolt, Beranek and Newman, Inc., Cambridge, Mass.)
Aerospace Medicine, vol. 35, Aug. 1964, p. 719–723. 12 refs.

A new method to prevent further incompatibility of aircraft noise and communities is presented. Generalized noise contour permitting estimation of the noise produced during takeoff, landing, and runup operations by one of several classes of aircraft form the basis of the procedure. Rather than describe in detail the noise generated by a particular aircraft type, the contours express the range of noise levels that will be perceived over a wide area by typical operations of aircraft falling into the various classes. The relative noisiness is presented in terms of perceived noise level, expressed in units called perceived noise decibels (PNdB), rather than the more familiar terms of sound pressure level in decibels. When all corrections have been made to the basic PNdB level contours determined for each type of operation of each class of aircraft, the resulting quantity is called composite noise rating (CNR). It is from CNR that the response to be anticipated from residential communities is estimated.

A64-80683
FATIGUE, WORK DECREMENT, AND ENDURANCE OF WOMEN IN A SIMPLE REPETITIVE TASK.
William R. Pierson and Aileene Lockhart (Lockheed-Calif. Co., Spacecraft Organ., Burbank; and Southern Calif. U., Dept. of Physical Education, Los Angeles).
Aerospace Medicine, vol. 35, Aug. 1964, p. 724–725. 11 refs.
Southern Calif. U.-supported research.

Fifteen college women were measured for reaction time and speed of arm movement in a simple repetitive stimulus-response task under normal, fatigued, decrement, and endurance conditions. For the population represented by the sample it may be concluded that fatigue (as a subjective expression of performance) is an important correlate of speed and isotonic endurance. Comparisons of the data were made with those obtained for men on the same apparatus and under similar conditions. From these comparisons the following conclusions appear justified: (1) men are faster than women in speed of arm movement but not in reaction time to a visual stimulus and (2) men can perform a simple repetitive task for a longer period of time than women but there is no difference in their subjective opinion as to when their performances are becoming slower.

A64-80684
GRAVITY, RADIATION AND GROWTH.
P. O. Montgomery, Eugene Rosenblum, and Betty Stapp (Tex. U., Southwestern Med. School, Depts. of Pathol. and Microbiol., Austin).
Aerospace Medicine, vol. 35, Aug. 1964, p. 731–733.
NASA Grant No. NsG-210-63; and AEC Contract No. AT(40-1)-2478.

Phage-free E. coli B cells were exposed to continuous ionizing radiation from a cobalt 60 source which delivered 55.8 r per hour. Cells so treated show a depression of their growth curves when compared to nonirradiated control cells. Ultrastructural observations indicate that these irradiated cells continue to enlarge despite their failure to divide. This enlargement involves the entire cell and its intracellular ultrastructural components. A comparison of these effects of X-radiation and the effects of increased gravity on these cells was made. It is apparent that increased gravity and increased X-radiation produce similar disturbances in the growth curves and in ultrastructural characteristics of E. coli B cells. The possibility that these alterations may be of a genetic nature is considered.

A64-80685
MICROWAVE HAZARDS EVALUATION.
H. S. Seth and S. Michaelson (Rochester U., School of Med. and Dentistry, Dept. of Radiation Biol., N.Y.)
Aerospace Medicine, vol. 35, Aug. 1964, p. 734–739. 19 refs.

The present evaluation is based upon experimental animal data and observations on radar personnel in the armed forces and industry. The injury caused by microwaves is mainly thermal. Nonthermal effects have not been proved beyond doubt. Experimental irradiation of animals is very different from the actual exposure of man in radar operation. Man, in comparison with experimental animals, has a much more efficient thermoregulatory mechanism. Extrapolation of animal data to man is, therefore, of limited value unless interspecies and intraspecies variability is recognized and considered. Additional hazards such as those due to ionizing radiation and toxic agents have been considered. Proper engineering and layout of equipment, education of personnel, and observance of certain precautions are practical and effective preventive measures which can be instituted without jeopardizing or interfering with radar operations. This should not lead to complacency and neglect of vigilance and search for possible ill-effects due to microwaves.

A64-80686
MOTOR VEHICLE ACCIDENTS OF FLYING AND NON-FLYING AIR FORCE PERSONNEL.
Martti J. Karvonen (Inst. of Occupational Health, Helsinki, Finland).
Aerospace Medicine, vol. 35, Aug. 1964, p. 739–740. 11 refs.

The hospital admissions and deaths from motor vehicle accidents in the United States Air Force were approximately 1.8 times as frequent among the nonflying as among the flying personnel. The rates for officers were from one half to one third of those of the corresponding total Air Force population. Even among the officers, the rates of the flyers tended to be lower than those of the nonflyers. Mortality from other injuries, i.e., primarily from aircraft accidents, is high among the flying personnel, but this is not reflected in the hospital admission rate. The mortality from motor vehicle accidents is compared with United States national figures for men of different ages. The effect of the age structure of the populations and of exposure is discussed. The conclusion appears valid that Air Force selection and/or flight training decrease the risk of motor vehicle accidents.

A64-80687
STUDIES ON DYSBARISM. I. INFLUENCE OF BRADYKININ AND "BRADYKININ-ANTAGONISTS" ON DECOMPRESSION SICKNESS IN MICE.
Chryssanthos Chryssanthou, John Kalberer, Jr., Samuel Kooperstein, and William Antopol (Beth Israel Hosp., Levy Labs., New York; and Port of N.Y. Authority, Med. Dept., N.Y.)
Aerospace Medicine, vol. 35, Aug. 1964, p. 741–746. 19 refs.
Contract No. AF 41(609)-1557; and PHS, Saul Singer Found., and Charles H. Silver Fund-supported research.

Decompression sickness, with high mortality and pathologic changes, can be produced regularly in hereditarily obese mice. Early, as well as delayed bone alterations, independent of decompression sickness are observed. Bradykinin administered immediately after decompression markedly reduces survival time, increases mortality rate and exaggerates the histologic changes. It is postulated that this effect on decompression sickness is due, at least in part, to the bronchoconstrictor action of bradykinin. Other mechanisms are also considered. Amidopyrine, 1-(N-methyl-piperidyl-4)-3-phenyl-4-benzyl-pyrazolone-5 and 2-(4-phenyl-1-piperazyl methyl)-cyclohexanone HCl which may be considered "bradykinin-antagonists" ameliorate decompression sickness to various degrees when given prior to compression. Particularly with the latter compound, mortality rate is significantly lowered, survival time increased, and histologic changes are absent or minimal. It is postulated that endogenous bradykinin may be a pathogenetic factor in dysbarism.

A64-80688
AN INVESTIGATION OF THE EFFECTS OF PRESSURE SUIT WEARING ON WORK OUTPUT CHARACTERISTICS.
I. Streimer, D. P. W. Turner, C. A. Tardiff, and T. L. Stephens (Boeing Co., Bioastronautics Sect., Seattle, Wash.)
Aerospace Medicine, vol. 35, Aug. 1964, p. 747–751. 41 refs.

Five male subjects performed the tasks of treadmill walking and extension/flexion cycling (normal and reduced traction situations) in normal shirt-sleeved environment and in pressurized and unpressurized but ventilated suits. Oxygen cost and cardiac output values indicated that work production suffered significant decrements attributable to suit wearing. The excess heat production of about 1,000 to 1,200 Btu per hour observed represents a great problem to designers of suits and systems in terms of such factors as suit ventilation and water removal requirements for space workers. In addition, if such rates are maintained at the drastically reduced levels of efficiency found here, the productivity of the operator must be curtailed. Therefore the assignment of tasks, work–rest cycles, manning requirements, etc., as now conceptualized may be unrealistic in terms of operator capability and potential.

A64-80689
VARIATIONS OF THE VIBROCARDIOGRAM OVER THE PRECORDIUM.
Clarence M. Agress and Shigeo Nakakura (Cedars of Lebanon Hosp., Inst. for Med. Res., Los Angeles, Calif.)
Aerospace Medicine, vol. 35, Aug. 1964, p. 752–757. 8 refs.
NASA-supported research.

Sixty-three vibrocardiograms (VbCG) were recorded in each of 11 athletes from a precordial area extending from the right sternal border to the left anterior axillary line and from the second to the fifth intercostal space. An area between the 4th to the 5th left intercostal spaces near the sternum was chosen as the standard location for the VbCG transducer. Clear wave forms were largely confined to the projection area of the cardiac silhouette onto the precordium. In 9 subjects construction of isotemporal lines permitted the calculation of the speed of transmission of the "J_1" and "J_2" waves across the surface of the chest at an approximate rate of 15 to 18 meters/second, in agreement with previous studies on the rates of transmission of sound through animal tissue. It was not possible to prove whether the vibrocardiographic waves merely spread over the precordium from their secondary sources (areas of earliest appearance) or whether the phenomenon is a much more complex process which is not amenable to this method of analysis.

A64-80690
HAND PREFERENCE IN AIRCREW: A STUDY OF THE CONSISTENCY AND STRENGTH OF LATERAL PREFERENCE FOR SIMPLE UNIMANUAL TASKS.
J. L. Gedye (Royal AF, Inst. of Aviation Med., Farnborough, England).
Aerospace Medicine, vol. 35, Aug. 1964, p. 757–763. 10 refs.

A comparative study of hand preference patterns in groups of pilots at different stages of training supports the possibility of some relationship between hand preference pattern and flying skill—both the consistency and strength of lateral preference being important. These findings point to the need for a followup study of a group of student pilots whose hand preference patterns have been assessed, particular attention being given to reasons for failure to qualify which indicate: (1) general lack of ability to learn complicated control procedures, (2) tendency to "directional" mistakes in the interpretation and response to presented information, and (3) abnormal susceptibility to spatial disorientation in flight.

A64-80691
ON THE ROLE OF GRAVITY IN HUMAN SPATIAL ORIENTATION.
Hermann Schöne (Max-Planck-Inst. für Verhaltensphysiol., Seewiesen, Germany).
Aerospace Medicine, vol. 35, Aug. 1964, p. 764–772. 39 refs.

Various experiments studying spatial orientation and its dependence on the function of gravity receptors are presented. The following were demonstrated: (1) perceived inclination increases with the strength of the force field; (2) the establishment of the subjective vertical and thus the perception of position is almost exclusively determined by the activity of the statolith organs and is influenced only to a small degree by other sensory clues; (3) the inclining of the head forward from the normal upright position so that the utricles lie perpendicular to the direction of movement of the space vehicle prevents disturbances in spatial orientation in response to change in acceleration; (4) when the head alone is tilted forward, the subject perceives 8° to 11° more inclination than when the whole body is tilted; this difference decreases with increasing backward inclination; (5) a given position in space causes a particular stimulation of the statolith apparatus which is fed back into the system and compared with the centrally present reference value; and (6) under the influence of increased field strength, the space (represented by a light spot or small optical sector) appears to shift in the same direction as the movement of the head.

A64-80692
THRESHOLDS FOR THE PERCEPTION OF LINEARLY INCREASING ANGULAR ACCELERATIONS.
H. von Diringshofen (Munich U. and Frankfurt/Main U., Germany), G. Kissel (Entwicklungsring Süd, Munich, Germany), and P. Osypka (Mayo Clinic Med. Sci. Bldg., Rochester, Minn.)
Aerospace Medicine, vol. 35, Aug. 1964, p. 775–778.

An examination on a flight simulator was made to determine whether the product of time and acceleration required for perception would remain constant in the presence of linearly increasing angular accelerations from 0.02°/sec.^{3} to 0.2°/sec.^{3} about the yaw axis or whether and in which way it would change. The subject sat with eyes closed in the hooded cockpit of the simulator. Each time the impression of movement had faded away, the next angular acceleration stimulus at a programed value of linear increase either to the left or to the right was presented. For evaluation of the results, 0.2 seconds were deducted; they represented the neuromuscular reaction, i.e., time from the perception of the stimulus until actuation of the switch. With increasing accelerations of 0.02°/sec.^{3} an evident decrease in the product of time and acceleration was observed. This is the reverse of results found in previous studies by other investigators at constant angular accelerations. The results are discussed with regard to attitude changes in aircraft and to the physiology of the semicircular canals.

A64-80693
THE VANISHING DISQUALIFICATION (CORNEAL ENDOTHELIAL DYSTROPHY).
Jed Lee Howard and James F. Culver (USAF School of Aerospace Med., Aerospace Med. Div., Ophthalmol. Dept., Brooks AFB, Tex.)
Aerospace Medicine, vol. 35, Aug. 1964, p. 779–780. 14 refs.

A case study of an Air Force pilot with endothelial dystrophy of the cornea is presented. Corneal edema accumulates at night when the eyelids are closed and relaxed. Therefore the usual symptoms are worse upon arising and tend to improve during the day. This appears to explain the periodic fluctuation in the course of this patient. It is the corneal edema which gives the appearance of halves around lights and leads the unwary to diagnose acute glaucoma. Despite the ability of this patient to see 20/20 with both eyes in the afternoon, aeromedical grounding was deemed necessary. This was in keeping with Air Force policy, which requires around-the-clock capability for flying.

A64-80694
VALUE OF FLUID AND ELECTROLYTE SUPPLEMENTS IN SUBARCTIC SURVIVAL SITUATIONS.
Terence A. Rogers and James A. Setliff (Hawaii U., Pacific Biomed. Res. Center, Honolulu).
Journal of Applied Physiology, vol. 19, Jul. 1964, p. 580–582.
Contracts No. AF 41(657)-364; and AF 41(609)-1918.

After 48 hours on a standard diet indoors, 30 men were subjected to cold and starvation in the winter subarctic. During the fast, ten men got 230 milliequivalents (mEq) NaCl each, ten got 115 mEq NaCl plus 115 mEq $NaHCO_3$, and the other ten got a placebo. Of each group of ten, five had water ad libitum and the other five each had a "forced" intake of 1,920 milliliters. In each electrolyte-supplemented group, those with the high water intake dehydrated to the same extent as those drinking ad libitum. Those getting NaCl or NaCl plus $NaHCO_3$ lost a mean of about 1 kilogram less weight than those in the placebo groups. The $NaHCO_3$ did not diminish the fasting acidosis.

A64-80695
PHYSIOLOGICAL REACTIONS TO COLD OF MEN IN THE ANTARCTIC.
C. H. Wyndham, R. Plotkin, and A. Munro (Transvaal and Orange Free State Chamber of Mines, Appl. Physiol. Lab.; and Baragwanath Hosp., Johannesburg, South Africa).
Journal of Applied Physiology, vol. 19, Jul. 1964, p. 593–597. 11 refs.

The physiological reactions to cold of five members of the 1961–1962 South African expedition to the Antarctic were studied in a climatic chamber in Johannesburg, and again after six months and after twelve months in the Antarctic. Their results were compared with the results of a control group in Johannesburg. The predeparture results were within the 95% significance intervals of the control group. After twelve months in the Antarctic their results fell outside the 95% significance intervals of the control group when at 5° C. air temperature, metabolism, average skin temperatures, rectal temperatures, and finger temperatures were all significantly lower; toe temperatures, however, were higher. There appeared to be a gradual adaptation and general toughening to the cold, because the subjects shed their clothing progressively until they could run about naked in the snow. The values at the thermoneutral zone of 27° C. did not change over the twelve months, however. It is therefore concluded that it is unlikely that the changes in physiological responses were of endocrine origin.

A64-80696
HEAT REACTIONS OF CAUCASIANS AND BANTU IN SOUTH AFRICA.
C. H. Wyndham, N. B. Strydom, and A. Munro (Transvaal and Orange Free State Chamber of Mines, Appl. Physiol. Lab., Johannesburg, South Africa).
Journal of Applied Physiology, vol. 19, Jul. 1964, p. 598–606. 21 refs.

Heat reactions of 20 Caucasian and 22 Bantu males were compared, first in the unacclimatized state and then in the acclimatized state. The study was conducted at temperatures of 90° F wet-bulb and 93° F dry-bulb at a work rate of one liter O_2/minute consumption. The performances of the unacclimatized Bantu were superior to those of the Caucasians. All 22 Bantu completed the four-hour experiment, while ten Caucasians failed. The mean rectal temperature of the Bantu was significantly lower than that of the Caucasians, but not the mean heart rate and mean sweat rate. When both groups were highly acclimatized all men from both groups completed the four-hour experiment, and their reactions to heat were significantly different from their reactions in the unacclimatized state. Sweat rates, particularly, increased very much. The differences between the two highly acclimatized groups in rectal temperatures, heart rates, and sweat rates (except the 4th hour) were not significant. Although superior in the unacclimatized state, the Bantu does not appear to have an inherent advantage in the ability to regulate the body temperature.

A64-80697
HEAT REACTIONS OF CAUCASIANS IN TEMPERATURE, IN HOT, DRY, AND IN HOT, HUMID CLIMATES.
C. H. Wyndham, N. B. Strydom, A. Munro, R. K. MacPherson, B. Metz, G. Schaff, and J. Schieber (Transvaal and Orange Free State Chamber of Mines, Appl. Physiol. Lab., Johannesburg, South Africa).
Journal of Applied Physiology, vol. 19, Jul. 1964, p. 607–612. 9 refs.

Heat reactions of Australian Caucasians living in hot, humid climates and of French Caucasians living in hot, dry climates were compared to unacclimatized and highly acclimatized male Caucasians living in Johannesburg. The experiments were conducted in climatic chambers at temperatures of 90° F wet-bulb and 93° F dry-bulb, and a workload of 1 liter O_2/minute consumption. The Australians did not differ significantly from the French in the three reactions to heat, except for a slightly significantly higher sweat rate in the first hour. Both had mean rectal temperatures and heart rates and higher sweat rates than the unacclimatized South Africans. Living and working in the hot, humid tropics and in the hot, dry desert confers a measure of acclimatization to heat which can be expressed quantitatively as 50% of the difference between unacclimatized and acclimatized men. This is less than that achieved by systematic artificial acclimatization.

A64-80698
TURNOVER RATE AND OXIDATION OF DIFFERENT FREE FATTY ACIDS IN MAN DURING EXERCISE.
Richard J. Havel, Lars A. Carlson, Lars-Göran Ekelund, and Alf Holmgren (Karolinska Hosp., King Gustaf V Res. Inst., Depts. of Clin. Physiol. and Med., Stockholm, Sweden; and Calif. U., Cardiovascular Res. Inst., San Francisco).

Journal of Applied Physiology, vol. 19, Jul. 1964, p. 613–618. 21 refs. Grants No. PHS-HE-0285 and H-7088; and Svenska Idrottens Vetenskapliga Forskningsra Grant.

Palmitate-9, 10-H^3 has been infused intravenously at a constant rate together with various C^{14}-labeled fatty acids in healthy subjects at rest and during exercise. No significant differences in the rates of fractional turnover were found between H^3-labeled palmitate and C^{14}-labeled palmitate or oleate. Retention of a considerably larger fraction of C^{14}-labeled linoleate in the blood plasma precluded accurate assessment of its fractional turnover rate. The rates of oxidation of palmitate-1-C^{14}, palmitate-U-C^{14}, oleate-1-C^{14}, and linoleate-1-C^{14} during exercise were similar. The relative abundance of palmitate, oleate, and linoleate in the free fatty acids of plasma changed little during exercise. It is concluded that palmitate-1-C^{14} is a valid tracer for measuring the turnover rate and oxidation of at least three-fourths of circulating free fatty acids under the conditions of study. The plasma concentration of glycerol increased promptly with exercise. Changes in its concentration closely followed those in the turnover rate of free fatty acids, but were of greater magnitude.

A64-80699

PARTITIONING OF RESPIRATORY FLOW RESISTANCE IN MAN.

B. G. Ferris, Jr., J. Mead, and L. H. Opie (Harvard School of Public Health, Dept. of Physiol., Boston, Mass.)

Journal of Applied Physiology, vol. 19, Jul. 1964, p. 653–658. 14 refs. Miriam Smith Rand Fund-supported research.

Measurements of flow resistance of various components of the respiratory system were obtained in adult male subjects in the sitting position. Nasal resistance is the largest single component being nearly one-half the total and two-thirds of the airway resistance during nose breathing. It is highly nonlinear, and shows much variability. During mouth breathing upper airway resistance (mouth, pharynx, glottis, larynx, and upper trachea) is also markedly nonlinear, and accounts for one-third the total airway resistance. Lower airway resistance is approximately linear up to flows of 2 liters/second. Pulmonary tissue resistance is low as reported in this study. Chest wall resistance is nearly linear up to flow rates of 2 liters/second and accounts for slightly less than half the total respiratory resistance during mouth breathing and 10% to 19% during nasal breathing.

A64-80700

LUNG VOLUME, COMPLIANCE, AND ARTERIAL OXYGEN TENSIONS DURING CONTROLLED VENTILATION.

Myron B. Laver, John Morgan, Henrik H. Bendixen, and Edward P. Radford, Jr. (Harvard Med. School at Mass. Gen. Hosp., Anaesthesia Lab., Boston).

Journal of Applied Physiology, vol. 19, Jul. 1964, p. 725–733. 17 refs. Grant No. PHS-G-HE-06848-02.

The relationship between total dynamic compliance (lung plus chest wall), functional residual capacity, and alveolar-arterial oxygen gradients (A-a DO_2) was studied in paralyzed dogs during constant-volume ventilation with pure oxygen. Rapid changes in functional residual capacity (FRC), produced by forced deflation of the lungs, were associated with a rapid fall in total compliance and rise in A-a DO_2. Subsequent hyperinflations (deep breaths) restored compliance to control levels more readily than A-a DO_2. Changes in the FRC, measured with a whole-body plethysmograph, were related directly to total compliance and inversely to A-a DO_2. Collapse of the terminal regions of the lungs produced by forced deflations was associated with a decrease in total compliance of 36%, and a decrease in FRC of 26% with a simultaneous rise in A-a DO_2 to a mean of 547 mm. Hg. It is concluded that intermittent deep breaths administered during constant-volume ventilation will not necessarily restore control levels of compliance and A-a DO_2 equally well. This difference is probably dependent on altered alveolar surface characteristics or mechanics, or both, secondary to the collapse process, which prevent restoration of structural integrity by a deep breath.

A64-80701

INFLUENCE OF CARBON DIOXIDE ON PULMONARY VASCULATURE.

R. W. Hyde, W. H. Lawson, and R. E. Forster (Penn. U., Graduate School of Med., Dept. of Physiol., Philadelphia).

Journal of Applied Physiology, vol. 19, Jul. 1964, p. 734–744. 29 refs. Life Insurance Med. Res. Fund-supported research.

The single-breath CO diffusing capacity (DL) and pulmonary vascular resistance (PVR) were measured in isolated perfused cat lungs exposed to varying concentrations of CO_2. The results indicate: (1) arteries and veins can constrict independently when directly exposed to elevated CO_2 tensions; and (2) if the capillaries and downstream vessels are exposed to elevated CO_2 tensions, DL is increased. A likely mechanism is that constriction downstream from the capillaries produces a rise in their transmural pressure, which in turn causes an increase in capillary blood volume. Among alternative explanations for the change in DL is the possibility that CO_2 increases the speed of the uptake of CO by erythrocytes.

A64-80702

MEASUREMENT OF AIRWAY RESISTANCE WITH A VOLUME DISPLACEMENT BODY PLETHYSMOGRAPH.

M. J. Jaeger and A. B. Otis (Fla. U., Coll. of Med., Dept. of Physiol., Gainesville).

Journal of Applied Physiology, vol. 19, Jul. 1964, p. 813–820. 26 refs. Contracts No. AF 41(657)-102 and AF 41(609)-1553; and Grant No. NIH-G-2-G-251.

Airway resistance was measured with a volume displacement body plethysmograph in 40 normal subjects breathing at their spontaneous breathing rate. The measurements are based on a method designed by DuBois et al. which was modified in order to extend its applicability. The subjects were rebreathing from a bag containing gas at approximately body temperature, ambient pressure, and saturated with water vapor (BTPS) conditions. Possible errors in conditioning the gas in the bag were corrected mathematically. The values of airway resistance obtained agree with those published by DuBois et al. and other authors using his technique. The measurements were found to correlate with results obtained on the same subjects with related techniques. The paper also includes measurements of lung tissue viscous resistance and inertness of the gas in the airways.

A64-80703

GALVANIC STIMULATION OF THE VESTIBULAR SYSTEM AND PERCEPTION OF THE VERTICAL.

Louis Aarons and Louis Goldenberg (Intern. Telephone and Telegraph Corp., ITT Data and Inform. Systems Div., Paramus, N.J.)

Perceptual and Motor Skills, vol. 19, Aug. 1964, p. 59–66. 9 refs.

The gravitational vertical within a tilted visual field was visually estimated by ten subjects during uni- and bilateral galvanic stimulation at 0.19 and 0.4 milliamperes through each of 6 cranial and 8 muscle electrode combinations. Verticality estimates were significantly different among subjects and the cranial electrode combinations. Improved and impaired estimates of about 1/2 to 1^0 gain or loss were dependent on both electrode polarity and laterality of stimulation with respect to the direction of visual field tilt. Stimulation at the mastoid shifted the apparent vertical away from the anode and toward the cathode. These deviations were larger with anode and unilateral stimulation than with cathode and bilateral stimulation. In contrast, neck stimulation produced shifts toward the anode. Significant deviations occurred with mastoid stimulation below the threshold for cutaneous sensation. Results were discussed with reference to muscle tonus distribution in the body, vestibular-ocular reflexes, and their interactive effects as implicated in motor-sensory feedback basic to coordination of movement.

A64-80704

SEX DIFFERENCES IN REACTIONS TO DELAYED AUDITORY FEEDBACK.

David L. Bachrach (Veterans Admin. Hosp., Coatesville, Pa.)

Perceptual and Motor Skills, vol. 19, Aug. 1964, p. 81–82. 6 refs.

Eight male and eight female subjects were required to read and speak extemporaneously under voice-masking (VM) and delayed auditory-feedback (DAF) conditions. All male subjects exhibited some degree of artificial stuttering under DAF. The speech behavior of the female subjects under DAF was much the same as under VM. Under considerable increase in side-tone intensity, the female subjects' speech behavior resembled that of the male subjects.

A64-80705

NOTE ON SHORT TERM STORAGE OF INFORMATION IN VISION.

Murray Eden (MIT, Res. Lab. of Electron., Cambridge).

Perceptual and Motor Skills, vol. 19, Aug. 1964, p. 93–94. Contract No. DA-36-039-AMC-03200(E); Grants No. NsG-496; NIH-G-NH-04737-03; and NSF-G-CS-16525.

Short-term memory experiments of previous workers are reevaluated with respect to their computation of two independent estimates of the decay time of short term storage. Questions of methodology are raised. An additional property of the readout process derived from the data is that the memory readout is linear.

A64-80706

FREQUENCY OF OCCURRENCE AND IDENTIFICATION OF AMBIGUOUS PERCEPTUAL FORMS.

James H. Brown U.S. Army Med. Res. Lab., Div. of Psychol., Fort Knox, Ky.)

Perceptual and Motor Skills, vol. 19, Aug. 1964, p. 119–129. 8 refs.

Differential frequency of stimulus presentation was manipulated in a training session during which 144 subjects identified nonsense form prototypes. Knowledge of results was given. In a test session subjects attempted to identify variations of the eight prototypes seen during training. The test task was to decide as to which of two prototypes a given variation was most similar, under some conditions a neither response was allowed. The results showed that the manipulation of differential frequency during a training session can lead to low-frequency responding to one type of test stimulus and high-frequency responding to another. These results were interpreted as supporting a perceptual set rather than a response bias explanation of the influence of frequency of stimulus occurrence.

A64-80707

MEASUREMENT OF MOTOR STYLES.

Neil G. Fahrion (Colo. U., Boulder and Denver).

Perceptual and Motor Skills, vol. 19, Aug. 1964, p. 139–146.
Grant No. PHS-G-M-4382.

In the attempt to depress and release a spring-loaded hand key slowly and steadily there was a significantly greater expenditure of energy by the preferred hand than by the nonpreferred hand when both performed the task together, but not when performance was independent. The expression of energy by the preferred hand resting passively on the key while the nonpreferred hand performed the depressing-and-releasing task was greater than that of the nonpreferred hand in the passive role. The expenditure of energy with either hand was significantly greater when both performed the depressing-and-releasing operation simultaneously than when one hand performed the task independently with the other resting passively upon the key. Individual differences in performance suggest two motor styles, speed control and tremor control.

A64-80708
MOTOR SKILLS BIBLIOGRAPHY. XLII. PSYCHOLOGICAL ABSTRACTS, 1963, VOLUME 37, FIRST HALF.
R. B. Ammons and C. H. Ammons (Mont. State U., Missoula).
Perceptual and Motor Skills, vol. 19, Aug. 1964, p. 147–150. 99 refs.
An alphabetical listing of 99 articles on perceptual-motor skills.

A64-80709
MEASUREMENT OF ATTENTIVE MOTOR PERFORMANCE AFTER ALCOHOL.
Robert B. Forney, Francis W. Hughes, and William H. Greatbatch (Ind. U., School of Med., Bloomington and Indianapolis).
Perceptual and Motor Skills, vol. 19, Aug. 1964, p. 151–154. 7 refs.
Grant No. PHS-AC-20.

Tracking apparatus is described in which attention and motor manipulation are required. Twenty-three subjects were tested prior to and after receiving alcohol (0.5 grams of ethyl alcohol per kilogram body weight). A mean decrease in performance, i.e., increase in error score, was noted in four tests, two of which reached statistically significant levels with blood alcohol concentrations measured at less than 50 mgm. per 100 ml. of blood.

A64-80710
PERCEPTION BIBLIOGRAPHY: XIV. PSYCHOLOGICAL INDEX, NO. 11, 1904.
R. B. Ammons and C. H. Ammons (Mont. State U., Missoula).
Perceptual and Motor Skills, vol. 19, Aug. 1964, p. 172–174. 76 refs.
An alphabetical listing of 76 references to work in perception in the Psychological Index, No. 11, 1904.

A64-80711
AN OBJECTIVE METHOD OF ASSESSING A STRESS SYNDROME RELATED TO ACHIEVEMENT MOTIVATION.
J. Warren Thiesen, Ronald H. Forgus, and Fred E. Spaner (Veterans Admin. Hosp., Downey, Ill.)
Perceptual and Motor Skills, vol. 19, Aug. 1964, p. 183–197. 16 refs.
An approach to the definition and assessment of a stress syndrome related to achievement motivation is described. A standard psychophysiological test procedure was devised to measure the intensity of stress referable to this syndrome. The method yields objective measures of degree and duration of heart-rate elevation in response to tasks emphasizing speed and accuracy pressures. An initial experiment demonstrated the validity of some theoretical constructs underlying the procedure. A retest study demonstrated its replicability and its potential for measuring adaptation to stress. The results indicate that the sustained heart-rate response, as utilized in this procedure, is a sensitive and convenient measure of stress associated with achievement motivation. It is suggested that the test battery and methodology described may be useful in research concerning striving-induced stress.

A64-80712
MICROVIBRATION, PERMANENT MUSCLE-ACTIVITY AND CONSTANCY OF BODY-TEMPERATURE.
H. Rohracher (Vienna U., Austria).
Perceptual and Motor Skills, vol. 19, Aug. 1964, p. 198.
Continuous microvibration (MV) created by alternating contractions of single muscle-fibers over the whole musculature of the body has been registered in all homothermic animals but not in poikilothermic organisms. Hibernating animals show long vibration-free periods with occasional small waves during hibernation and normal continuous MV tracings after awakening. MV is viewed as a thermoregulating mechanism insuring temperature constancy in warmblooded animals during rest, sleep, and anesthesia. It is calculated that continuous alternating contractions of 2.5% of the musculature of a man weighing 155 lb. provide the required 1,700 large calories per day. An adjustment of the organism's heat production to outside temperature is effected through changes in MV frequency.

A64-80713
HYPNOTIC CONTROL OF A COMPENSATORY TRACKING TASK.
Nathaniel J. Ehrlich (Mich. U., Ann Arbor).
Perceptual and Motor Skills, vol. 19, Aug. 1964, p. 232–234.

A subject was trained in a compensatory tracking task in the normal compatibility position. Hypnotic training was given in the assumption of a designated state of sensorimotor arousal during the tracking performance. In the second part of the experiment the subject replicated the previous trials until he was told that the next series of trials would be under reverse compatibility conditions. Under hypnosis reverse compatibility was reinforced by a suggestion to think opposite. Then the subject was awakened and performed the tracking task under reverse compatibility with different arousal cues. Except for the slight arousal condition the learning function was undisturbed by the switch from normal to reverse compatibility. The consistency in the separation of arousal conditions was maintained. The results raise doubts as to the validity of the hypothesis of population stereotypes as sources of proactive inhibition.

A64-80714
VARIABLES OF SURFACE TEXTURE AND ACCURACY OF SPACE PERCEPTIONS.
Howard R. Flock and Anthony Moscatelli (N.Y. City U., Hunter Coll., N.Y.)
Perceptual and Motor Skills, vol. 19, Aug. 1964, p. 327–334. 6 refs.
Grant No. NIMH-MH-06942-01.

Six surface textures possessed differing degrees of irregularity as measured by the standard deviation describing the irregularity, and numbers of redundancies. Each surface was presented at nine different slants to a different group of twelve subjects who monocularly viewed the stationary surface through a 38° aperture. Regression coefficients measured effects of texture on slant judgments. A replication with six subjects to a group and different experimenters was performed four months later. Judgmental errors varied with the magnitude of an irregularity, redundancies having lesser effects. Individual data and effects of a blank surface are also evaluated.

A64-80715
SOME BIOCHEMICAL CHANGES IN PEOPLE WORKING WITH MICROWAVES [NEKTERE BIOCHEMICKE ZMENY U PRACUJICICH S CENTIMETROVYMI VLNAMI].
V. Bartonicek and E. Klimková-Deutschová.
Casopis lekaru ceskych, vol. 103, 1964, p. 26–30. 15 refs. In Czech.
Results of blood sugar curves, pyruvic and lactic acid blood levels, and the creatinine content of urine in the course of 24 hours in workers exposed to electromagnetic radiation of the order of cm. waves are evaluated. From a total of 27 blood sugar curves three-quarters had initial values higher than normal, in rare instances glycosuria was found. Shapes of some curves were prediabetic while those of others were hepatic or flat; in rare instances they had two or three peaks. The lactic and pyruvic acid and creatinine values did not differ significantly from normal values. The importance of these findings for the diagnosis of the initial pseudoneurasthenic stage of the disease is discussed.

A64-80716
LOSS OF CONSCIOUSNESS ASSOCIATED WITH POISONING [PORUCHY VEDOMI PRI OTRAVACH].
Ota Riedl (Karlovy v Praze U., Prague, Czechoslavakia).
Vnitrni lekarstvi, vol. 10, 1964, p. 183–188. 7 refs. In Czech.
A simplified concept of consciousness and its disturbances are presented as related to toxicology. Important aspects connected with the management of a case of poisoning with disturbances of consciousness are emphasized. Poisoning due to carbon monoxide, hypnotics, analgesic anodynes and antipyretics, plants of the genus solanacea and their alkaloids, is discussed extensively. Brief reference is made to poisoning due to ataractics and alcohol.

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